Springer Series on Cultural Computing

Vladimir Geroimenko *Editor*

Augmented Reality Art

From an Emerging Technology to a Novel Creative Medium

Springer

Springer Series on Cultural Computing

For further volumes:
http://www.springer.com/series/10481

Vladimir Geroimenko
Editor

Augmented Reality Art

From an Emerging Technology to a Novel Creative Medium

Springer

Editor
Vladimir Geroimenko
School of Art and Media
Plymouth University
Plymouth, Devon, UK

ISSN 2195-9056 ISSN 2195-9064 (electronic)
ISBN 978-3-319-06202-0 ISBN 978-3-319-06203-7 (eBook)
DOI 10.1007/978-3-319-06203-7
Springer Cham Heidelberg New York Dordrecht London

Library of Congress Control Number: 2014941933

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

This pioneering book is dedicated to the future generations of augmented reality artists

Preface

The book you are holding in your hands in a paper, or more likely digital, format is a unique one. This is the first ever monograph on augmented reality art. It is written by a team of world-leading artists and researchers, pioneers in the use of augmented reality as a novel artistic medium, and is being dedicated to the future generations of augmented reality artists.

The book explores a wide range of major aspects of augmented reality art and its enabling technology. It is intended to be a starting point and essential reading not only for artists, researchers and technology developers, but also for students and everyone who is interested in emerging augmented reality technology and its current and future applications in art.

It was very difficult to make this book happen, because augmented reality art is still in its infancy at present, and there are therefore relatively few research materials available. We owe a debt to our contributors who have managed to produce this monograph in the face of these difficulties. The team includes 25 artists and researchers from 6 countries (USA, Australia, Italy, UK, Romania and Germany). The majority of the authors are either members of the Manifest.AR group (www.manifestar.info), or contributors to the only substantial collection of articles on augmented reality art available so far (*Not Here, Not There* double issue of *Leonardo Electronic Almanac,* 2013, Vol. 19, No. 1 & 2).

Manifest.AR is the first artist collective that started using augmented reality (AR) to create art and activist works. The group was formed when AR creation first became possible on smartphones. Manifest.AR explores what makes AR unique as a medium, separating it from other forms of new media such as virtual reality, web art, video and physical computing.

The collective found its roots in the groundbreaking 2010 We AR in MoMA intervention. Mark Skwarek and Sander Veenhof realized they could challenge the Museum of Modern Art's extreme exclusivity by placing art works inside and around the museum, and invited selected artists to participate. Finding talented and accomplished AR artists for the show was very difficult – at the time of the MoMA intervention, very few people even knew what AR was. The group of invited participants included most of those who became core founders of Manifest.AR:

Sander Veenhof, Mark Skwarek, Tamiko Thiel, Will Pappenheimer, Christopher Manzione and John Craig Freeman.

After the We AR in MoMA intervention it was time to put down in words the thoughts, goals and future visions of the first artists working with this new technology. Tamiko Thiel proposed choosing a group name to give an identity to future collaborations. Sander Veenhof suggested the name Manifest.AR, and that the group should write a manifesto to document this historic moment, the birth of mobile AR as an art form. Mark Skwarek brought together what became the original founder's group (the above artists, plus Geoffrey Alan Rhodes) and was the driving force behind getting the group to write and publish the "AR Art Manifesto," Manifest.AR's debut as a group entity, on January 25, 2011.

Here is the manifesto in full:

"All that is Visible must grow beyond itself and extend into the Realm of the Invisible" (Tron, 1982).

Augmented Reality (AR) creates Coexistent Spacial Realities, in which Anything is possible – Anywhere!

The AR Future is without boundaries between the Real and the Virtual. In the AR Future we become the Media. Freeing the Virtual from a Stagnant Screen we transform Data into physical, Real-Time Space.

The Safety Glass of the Display is shattered and the Physical and Virtual are united in a new In-Between Space. In this Space is where we choose to Create.

We are breaking down the mysterious Doors of the Impossible! Time and Space died yesterday. We already live in the Absolute, because we have created eternal, omnipresent Geolocative Presence.

In the 21st Century, Screens are no longer Borders. Cameras are no longer Memories. With AR the Virtual augments and enhances the Real, setting the Material World in a dialogue with Space and Time.

In the Age of the Instantaneous Virtual Collective, AR Activists aggravate and relieve the Surface Tension and Osmotic Pressure between the so-called Networked Virtual and the so-called Physical Real.

Now hordes of Networked AR Creatives deploy Viral Virtual Media to overlay, then overwhelm closed Social Systems lodged in Physical Hierarchies. They create subliminal, aesthetic and political AR Provocations, triggering Techno-Disturbances in a substratosphere of Online and Offline Experience.

Standing firmly in the Real, we expand the influence of the Virtual, integrating and mapping it onto the World around us. Objects, banal By-Products, Ghost Imagery and Radical Events will co-exist in our Private Homes and in our Public Spaces.

With AR we install, revise, permeate, simulate, expose, decorate, crack, infest and unmask Public Institutions, Identities and Objects previously held by Elite Purveyors of Public and Artistic Policy in the so-called Physical Real.

The mobile phone and future Visualization Devices are material witness to these Ephemeral Dimensional Objects, Post-Sculptural Events and Inventive Architectures. We invade Reality with our Viral Virtual Spirit.

AR is not an Avant-Garde Martial Plan of Displacement, it is an Additive Access Movement that Layers and Relates and Merges. It embraces all Modalities. Against the Spectacle, the Realized Augmented Culture introduces Total Participation.

Augmented Reality is a new Form of Art, but it is Anti-Art. It is Primitive, which amplifies its Viral Potency. It is Bad Painting challenging the definition of Good Painting. It shows up in the Wrong Places. It Takes the Stage without permission. It is Relational Conceptual Art that Self-Actualizes.

AR Art is Anti-Gravity, it is Hidden and must be Found. It is Unstable and Inconstant. It is Being and Becoming, Real and Immaterial. It is There and can be Found – if you Seek It.

The content of the book is arranged as follows. You can read chapters in sequence or randomly.

Chapter 1 "Augmented Reality Activism" narrates the exciting story of the first generation of activists that began working with augmented reality to further their causes. These activists pioneered the development of mobile AR in search of what made it unique from other mediums and what traits could be used to further activists agendas. Many of these works are the first explorations of their type with this new technology and act as a road map for future activists working with AR. What dangers do those working with this technology face? Does AR have the ability to empower the masses? Can it create real social change and can it unite society by turning virtual experiences into physical ones? The activists in this chapter set out to find these answers.

Chapter 2 "Critical Interventions into Canonical Spaces" describes augmented reality interventions led by the author in 2011 with the artist group Manifest.AR at the Venice Biennale, and in collaboration with the design office PATTU at the Istanbul Biennale. The interventions used the emerging technology of mobile augmented reality to geolocate virtual artworks inside the normally curatorially closed spaces of the exhibitions via GPS coordinates. Unlike physical art interventions, the artworks cannot be removed or blocked by the curators or other authorities, and will remain at those locations as long as the artist desires. The artworks exploit the site-specificity as an integral part of the artwork while simultaneously questioning the value of location to canonize works of art, and the power of the curator as gatekeeper to control access to the spaces that consecrate works of art as part of the high art canon.

Chapter 3 "Beyond the Virtual Public Square: Ubiquitous Computing and the New Politics of Well-Being" first explores augmented reality and ubiquitous computing in general and then describes examples of place-based augmented reality artworks within the framework of electracy (the digital apparatus). Apparatus theory correlates technological innovations with the corresponding inventions in institutional practices, including individual and collective identity behaviours. The authors, working with an electrate consultancy (the EmerAgency), test an augmented deliberative design rhetoric intended to overcome individual alienation from collective agency. It is an electrate equivalent of the ancient Theoria. Theoria, augmented by literacy, became journalism – the fourth estate of a democratic

society. The konsult practice described in this chapter updates Theoria for a fifth estate with a new function supporting collective well-being, in the global experience of a potentially ubiquitous public square.

Chapter 4 "Augmented Interventions: Re-defining Urban Interventions with AR and Open Data" proposes that augmented reality art and open data offer the potential for a redefinition of urban interventionist art practices. It examines the possibilities for redefining the activist art practice of urban intervention with data and augmented reality to introduce new hybrid techniques for critical spatial practice. The combination of augmented reality and open data is seen to provide a powerful tool-set for the artist/activist to augment specific sites with a critical, context-specific data layer. Such situated interventions offer powerful new methods for the political activation of sites which enhance and strengthen traditional non-virtual approaches and should be thought of as complementary to physical intervention. The chapter offers a case study of the author's *NAMAland* project, a mobile artwork which used open data and augmented reality to visualise and critique aspects of the Irish financial collapse.

Chapter 5 "The Aesthetics of Liminality: Augmentation as an Art Form" reveals that while one can make arguments that much AR-based art is a convergence between handheld device art and Virtual Reality, there are gestures that are specific to augmented reality that allow for its specificity as a genre. The chapter explores some historical examples of AR and critical issues of the AR-based gesture, such as compounding of the gaze, problematizing of the "retinal", and the representational issues of informatic overlays. This also generates four gestural vectors analogous to those defined in his chapter in the *Oxford Handbook of Virtuality* (2014), which is being examined through case studies. Through these studies, it is hoped that a deeper understanding of an augmented semiotics can be achieved.

Chapter 6 "Augmented Reality in Art: Aesthetics and Material for Expression" starts with an analysis of Cinematic Apparatus theory of the 1970s that set the stage for an investigation of cinematic expression in avant-garde film art through a deconstruction of its materials. The material and production elements repressed in the normal ideological apparatus became the arena for new expression. Cinema accelerated the mechanization and sequence of its era to create the essential medium of that era; augmented reality is a similar acceleration of the electric image that first emerged with electric video installation. Using Jean-Louis Baudry's diagram of the cinematographic apparatus as reference, this chapter excavates and diagrams the electric image apparatus to search out the repressed and revealed in viewers' perception. For augmented reality, the first medium which fully realizes the electric image, a new way forward is proposed, towards an avant-garde AR(t).

Chapter 7 "Digital Borders and the Virtual Gallery" shows that augmented reality art, as a new media subset, distinguishes itself through its peculiar mechanics of exhibition and performative re-contextualization. It allows the artist to translocate the borders and constraints of the experience from physical to virtual, expressing the piece onto spaces independent of physical or locative constraint, yet still tethered to the real world. This practice of anchoring virtual assets to the physical world allows artists to make use of virtual properties such as mutability and replication, while engaging with issues of embodiment, performance, and presence. The ability to customize work's boundaries, to draw one's own curatorial borders and parameters,

is in itself a freedom drawing from augmented reality's strengths, inviting a model of the world as not one in which art happens, but one which is conditionally defined and experienced as an integrative work of art.

Chapter 8 "Immersive Art in Augmented Reality" studies how current AR technology has taken a turn away from the attempt at a sensorial suspension of disbelief in favor of a new social form of immersion. In this new model, space is collapsed not between the real and the virtual, but instead between people in distance and time. In context of the new mobile form of augmented reality that is based on social interactivity, artists are now beginning to examine the cultural potential this new medium can offer. This chapter will explore several components of this new artistic medium and some markers from art history and gaming culture that help to explain the history of how we have arrived at this new social AR medium. Specifically it will look at socially immersive artworks and collaborative locative media as outcomes of this new medium based on social immersion rather than sensorial immersion.

Chapter 9 "Skin to Skin: Performing Augmented Reality" undertakes an examination of the use of augmented reality in recent examples of digital performance and installation investigation at the Deakin Motion.Lab. In particular, the authors discuss the concept of 'digital dualism' as a means of mapping some of the conceptual shifts augmented reality makes possible for dance and performance technology. Digital dualism sees the disjuncture between 'real' and 'virtual' in digital performance, as in life, as an artefact of an earlier technological/cultural moment in which the digital had not yet become embedded within and a conduit for everyday life. The authors argue that digital performance within an augmented reality framework provides a demonstration of the inability of digital dualism to stand up even in relation to what might be considered the most unlikely candidate for digital distribution – the embodied experience of the human body.

Chapter 10 "Augmented Reality Painting and Sculpture: From Experimental Artworks to Art for Sale" focuses on a use of augmented reality that is more closely related to traditional painting and sculpture than to interactive game-like AR installations. Based on an analysis of the author's experimental paintings and sculptures, presented in his solo exhibition *Hidden Realities* and the outdoor installation *The Enterprise Jigsaw*, it deals with a particular type of augmented reality paintings that integrate gallery-quality art prints of digital paintings with augmentation by 2D and 3D objects. This type of painting can provide one easy and reliable solution to the acute problem of the saleability of augmented reality art. Alongside theoretical considerations, the first ever augmented reality painting for sale on Amazon is presented – the author's artwork *The Half Kiss.* Similar possibilities for AR sculptures are also analysed.

Chapter 11 "Augmented Reality Graffiti and Street Art" looks at how the concept of augmented reality graffiti enables us to experience an expanded view of the urban environment. It examines how the intersection between graffiti, street art and AR provides us with a complex socially and technologically encoded interface, which has the potential to combine the first-hand experience of public space with digital media, and creative practices, in a hybrid composition. The chapter begins by looking at the tradition of graffiti and street art; this is followed by a discussion

around the philosophical implications for digitally augmented graffiti. A number of key techniques and technologies are then explored through the use of two practice-based case studies.

Chapter 12 "Why We Might Augment Reality: Art's Role in the Development of Cognition" shows that an important aspect of Behavioral Art is "borrowing intelligence" from a humanly organized source, such as a painting, and applies it to a computer process. This process might easily be mistaken for an objet de (computer) art, but we must look further into the larger dynamic system, one that includes the audience as well. Since the machine itself is incapable of any type of organization, a human must supply the organizational paradigm to the input, and a human must recognize one in the output. However, by sampling from the environment via machine, a process we can now call augmented reality, we might imbue whatever quality triggered an interpretation of "potentially meaningful" in audience members regarding that painting, to our computed output. This chapter addresses how and why humans tends to employ this particular form of nonverbal expression.

Chapter 13 "Augmenting Wilderness: Points of Interest in Pre-Connected Worlds" looks at the way the aesthetics of object-oriented ontology performs in association with augmented reality art made on the borders of Internet connection. The focus of the research is on the notion of 'wilderness onticology' by Levi Bryant, and the ideas of 'hyperobjectivity' by Timothy Morton, while examining artworks by George Ahgupuk, Alvin Lucier, Mark Skwarek, Nathan Shafer, v1b3, and John Craig Freeman. Most of the conclusions of the research point to the praxis of the art historical anti-tradition as a tool for negotiating ontologies of the wilderness, or the unknown, as well as the virtual objects which exist there, for creating socially useful forms of art. Other topics include the usage of the Earth art binary of site/non-site, media ecology and the flanuer.

Chapter 14 "An Emotional Compass: Emotions on Social Networks and a new Experience of Cities" analyses the methodology and technique used to design and develop an Emotional Compass, a device for orientation in urban environments which uses geolocated content harvested from major social networks to create novel forms of urban navigation. This user-generated content is processed in real-time to capture emotional information as well as geolocation data and different types of additional meta-data. This information is then rendered on mobile screens under the form of a Compass interface, which can be used to understand the direction and locations in which specific emotions have been expressed on social networks. This gives rise to achieve novel ways for experiencing the city, including peculiar forms of way-finding techniques which rely on emotions rather then street names and buildings.

Chapter 15 "Augmenting the Archaeological Record with Art: The Time Maps Project" proposes a new method for evoking the complexity of the Past from the archaeological record, based on a transdisciplinary approach linking science, art and technology. Inspired from the fractal-theory, this method employs different levels of augmentations from general context to detail and uses a combination of augmented reality techniques and visual media, with a high artistic quality, to create

a mixed-reality user experience. The chapter presents an experimental augmented reality application on mobile devices, and discusses the efficacy of the method for an educational strategy to help communities recover and transmit their immaterial heritage to future generations. The research was based in Vadastra village, southern Romania, in an archaeological complex of a prehistoric settlement.

Chapter 16 "Spatial Narratives in Art" analyzes the work of artists who use augmentation, information and immersion in specific contexts – public or private spaces. The aim of the analysis is to understand socio-cultural transformations in the fields of art and technology in social space and what new forms of aggregation and participation have developed, providing an opportunity to reflect on new concepts of democracy that are emerging in our global media age. The question underlying the study is how do artists who use augmentation, information and immersion give new meaning to the concept of public space, changing the proprietary boundaries of that space and concept of what it is to perceive reality.

Chapter 17 "Shifting Perceptions – Shifting Realities" is an artistic journey to define perceptual shifts, explore the multiplicity of realities and reveal the many layers of a sense of presence through Immersion. AR art incorporated in small southern Indiana town makes the locals wary of strangers waving computer devices to capture photographs of their sanctuary. The musings and conversations that transpire offer a window into a world beyond AR which opens up an awareness to the historicity of the moment. The AR appears as a balloon shaped heart blazing with a picture of Lenin raising his arm to the sky. The AR is motivated by Skwarek's participation in the Occupy movement and the celebration of May Day and the motivations of these movements are also discussed. AR facilitates an investigation of space and an earnestness of place in the community.

Chapter 18 "Wearable Apocalypses: Enabling Technologies for Aspiring Destroyers of Worlds" examines "Apocalypse" by William S. Burroughs (novelist, essayist, painter 1914–1997), an essay on the possibilities of street art that he wrote as a collaboration with Keith Haring (pop and graffiti artist, social activist 1958–1990). While written in 1988 this essay can serve as a guide for current and future artists who work in augmented reality interventions into public spaces by situating their work within a 2000+ year old cycle of revolution and counter revolution in art, culture, and spirituality. The author's contention is that looking backward to pre-modern mythology in this way provides larger frame of reference that is even more useful to contemporary augmented reality artists than it was to the graffiti artists of the 1980s that this essay was originally discussing, as the technological and artistic affordances of mobile devices have expanded the possibilities of street art to begin to match Burroughs' vision.

Finally, we hope that the reader will not judge us too harshly. We have accepted the challenge of being the first and we have done our best to bring out this pioneering work. Just go ahead and read the book. We hope sincerely that you will enjoy it.

Plymouth, UK — Vladimir Geroimenko
New York, USA — Mark Skwarek

Contents

Contributors

Damon Loren Baker Department of Entertainment Technology, New York City College of Technology (CUNY), Brooklyn, NY, USA

Alison Bennett Deakin Motion.Lab, School of Communication and Creative Arts, Deakin University, Melbourne, Australia

Margaret Dolinsky HR Hope School of Fine Arts, Pervasive Technology Institute, Institute of Digital Arts and Humanities, Indiana University, Bloomington, IN, USA

John Craig Freeman Department of Visual and Media Arts, Emerson College, Boston, MA, USA

Jacob Garbe Center for Games and Playable Media, University of California Santa Cruz, Santa Cruz, CA, USA

Vladimir Geroimenko School of Art and Media, Plymouth University, Plymouth, Devon, UK

Dragoş Gheorghiu Doctoral School, National University of Arts, Bucharest, Romania

Ian Gwilt Department of Design and Visual Communication, Art and Design Research Centre (ADRC), Sheffield Hallam University, Sheffield, UK

Stephanie Hutchison Deakin Motion.Lab, School of Communication and Creative Arts, Deakin University, Melbourne, Australia

Salvatore Iaconesi Department of Digital Design, ISIA School of Design, Florence, Italy

Patrick Lichty University of Wisconsin, Milwaukee, Digital Studio Practice

Simona Lodi Share Festival (Turin), Art Critic and Curator, Turin, Italy

Todd Margolis California Institute of Telecommunications and Information Technology (Calit2), University of California, San Diego, CA, USA

John McCormick Deakin Motion.Lab, School of Communication and Creative Arts, Deakin University, Melbourne, Australia

Conor McGarrigle Emergent Digital Practices, University of Denver, Denver, CO, USA

Oriana Persico Department of Digital Design, ISIA School of Design, Florence, Italy

Geoffrey Alan Rhodes Department of Visual Communication Design, School of the Art Institute of Chicago, Chicago, IL, USA

Nathan Shafer Founder, Institute for Speculative Media, University of Alaska Anchorage, Honors College, Complex Systems, Anchorage School District, Structured Learning, AK, USA

Mark Skwarek NYU Polytechnic School of Engineering, New York, NY, USA

Livia Ştefan Integrated Applications Department, Institute for Computers, Bucharest, Romania

Tamiko Thiel Artist and Manifest.AR co-founder, USA, DE, JP

Gregory L. Ulmer Department of English and Media Studies, University of Florida, Gainesville, FL, USA

Jordan Beth Vincent Deakin Motion.Lab, School of Communication and Creative Arts, Deakin University, Melbourne, Australia

Kim Vincs Deakin Motion.Lab, School of Communication and Creative Arts, Deakin University, Melbourne, Australia

Judson Wright Artist/programmer, Pump Orgin, New York, NY, USA

Part I
Emerging Augmented Reality Technology and the Birth of Augmented Reality Art

Chapter 1
Augmented Reality Activism

Mark Skwarek

1.1 Introduction

Arguably two of the most important activist events in recent U. S. history were that of the Occupy Wall Street movement and the whistle blowing by Edward Snowden (see Fig. 1.1). The two events highlight differences between physical and virtual approaches to activism and their end results.

Many, including some of the mainstream media, argue that the physical presence of protesters in the streets of the Occupy movement accomplished very little if nothing at all. Yet Occupy created a movement which organized and inspired a new generation of activists, sweeping across the globe. In contrast, Snowden's leaked information shook American society to the core. Although both actions utilized technology, Occupy was largely an effort that took place by taking over the real world with people on the ground. Snowden's action was accomplished largely through the use of technology and courage. The implications of his actions have changed the way we think about communication and the political elite. Does the impact of technology give activists the upper hand in the effort to create change in society or does it remove people in the street from the equation? An emerging technology called augmented reality has the ability to combine both the physical experience of the streets and digital experience of the Internet. AR has the power to take net based activism such as blogging or even hacktivism (hacktivism is activism with hacked electronic equipment. See http://en.wikipedia.org/wiki/Hacktivism) and turn it into a real world experience. AR allows activists to place their messages at specific locations anyplace on the face of the earth and share those messages with others either physically at the site or online.

M. Skwarek (✉)
NYU Polytechnic School of Engineering, New York, NY, USA
e-mail: mark.skwarek@gmail.com; http://www.markskwarek.com

V. Geroimenko (ed.), *Augmented Reality Art: From an Emerging Technology to a Novel Creative Medium*, Springer Series on Cultural Computing,
DOI 10.1007/978-3-319-06203-7_1,

Fig. 1.1 Mark Skwarek, *ProtestAR*, AR Zucotti Park Occupiers in front of NYSE (2011) (Images reproduced courtesy of the artist)

The effects of both Occupy and Snowden were felt across the globe. While both actions had ties to technology, Occupy was largely about the people taking over public space and voicing their problems with the failure of the system during an economic meltdown. Snowden's information leak was done with the aid of technology, by infiltrating the NSA's system and removing computer files that exposed their misdeeds.

In the wake of the initial Occupy Wall Street Movement the question of the activist's role in modern day society comes into question. What Occupy accomplished raises many heated debates. What is not in question is that the movement swept across the nation and then the world with the help of the Internet and social media.

Technology in the hands of the masses has had a profound impact on the history and reach of activism. The public now has access to technology which to most people was unimaginable only a few years ago. Now relatively inexpensive, incredibly powerful, networked mobile technology is beginning to find its way into the hands of people around the world. The new technologies grant the public abilities which would once be considered super-human, but also create a tool that can be exploited, manipulated and used to spy upon the public.

Some activists have begun working with AR to see its potential as a tool for social change. The works covered in this chapter explore what makes AR unique as a medium and which of its qualities can be best utilized to further activist causes. This text will document the first activist explorations with AR, what has been done, and compare it to activist approaches from the past and future.

1.2 Past Activists and Their Technology

Activism has a long and accomplished history of creating change on a global scale long before the incorporation of electronic technology. Societies have always organized against repression by any means available. They have been organizing and participating in mass protests against the political and corporate elite since the beginning of recorded history. One of the first recorded mass protests took place in ancient Egypt when workers constructing a royal necropolis did not receive payment. They performed a sit in inside the mortuary temples and refused to leave until they received it (Andrews 2012).

Recently, Egyptians again rose up in protest and occupied the Tahrir Square. This time they were aided by technologies like cell phones and social media. With or without technology, humans will adapt to the situation and use whatever is available to create social change when faced with injustice. Long ago fires and bells were used to signal approaching danger. Paul Revere used lanterns to warn of the approaching British forces. Technology will never be a fix-all solution to fight injustice but it can aid activists to help level the playing field against the corrupt elite.

Another example: In 1888 Jacob Riis began documenting the horrific living conditions of the lower classes in the New York City slums (see Fig. 1.2). Riis made the their largely unseen and unknown living conditions visible to the world by using

Fig. 1.2 Jacob Riis, *Five Cents a Spot* (1974) (Images reproduced courtesy of the Museum of Modern Art)

Fig. 1.3 Krzysztof Wodiczko, *Projection on South Africa House*, Trafalgar Square, London, (1985) (Images reproduced under creative commons)

the newly invented flash photography technology. Riis pioneered the use the flash to capture images in the dark alleyways and interiors of the tenements and slums of New York City. Riis's images had previously been impossible to create before the use of the flash (Yochelson et al. 2007).

More recently art activist Krzysztof Wodiczko began pioneering guerilla projection; he utilized very powerful machines capable of projecting images onto entire buildings facades (see Fig. 1.3). In 1985 he famously projected a swastika onto the South African Embassy in London for a period of about 2 h before it was shut down by the police. Although the work was short lived photos of the intervention were circulated around the global press reaching the eyes of millions (Barnet 2009).

1.3 Augmented Reality Activism

Activist approaches of the past may have become less effective or may not have worked as effectively against the new tactics of the political and financial elite. The techniques used by the ancient Egyptian royal necropolis workers to organize may not have been as effective if duplicated for a twentieth century occupation.

The Critical Art Ensemble (CAE), argues: “At one point in time the control of the street was a valued item. In nineteenth century Paris the streets were the conduits for the mobility of power, whether it was the economic or military in nature. If the streets were blocked, and key political fortresses were occupied, the state became inert, and in some cases collapsed under its own weight. This method of resistance was still useful up through the 1960s, but since the end of the nineteenth century it has yielded diminishing returns, and has drifted from being a radical practice to a liberal one.” (Critical Art Ensemble 1997).

Some see the Occupy movement as fitting CAE’s classification having achieved very little in the form of political change. Yet the movement spread over 951 cities across 82 countries inspiring a global community of activists (Bell 2011). The power of the digital network and the effect it can have is unquestionable such as the cyber attacks which shut down the Estonian internet in 2007. Yet human beings are social creatures who will naturally form communal groups when oppressed by those in wielding power. AR is the medium that has the power to bring CAE’s electronic civil disobedience and the actions in the street together.

AR allows ideas and messages to be overlayed onto the real world digitally with the purpose of achieving activist goals. Activists can create work with AR software such as Layar and Junaio to make their own inexpensive AR protests using their personal smart phones. Having access to low-cost tools allow more freedom to create and distribute activist messages rooted to the physical world. The goal is generally for the message to reach and mobilize the largest audience possible. AR can turn the global community into an audience while at the same time giving them a voice.

1.4 The Case for Augmented Reality

AR is a technology which has recently become much more accessible to the general public in parallel with the invention of the smart phone. Mobile technology is sweeping the globe. A trickle down effect has mobile technology beginning to reach developing countries (Carter 2013). More and more people worldwide will have access to networked mobile devices such as smartphones and tablets.

Mobile AR gives activists the ability to make anything anywhere with no cost besides access to a computer and an Internet connection. The borders that separate public and private space no longer restrict the activist’s vision. An activist can trigger a protest in a city even when he or she is sitting half way across the globe.

AR can never replace the physical presence of people just like it can never replace reality as a whole; it is merely a tool just like the other tools used by the activists such as placards, sign boards, graffiti, fliers and blogs and so on.

AR is ideal as a social tool to generate conversations in and around the community. It’s often experienced in public space at the site of a problem which creates an opportunity to engage people in conversation. AR can create experiences which make people laugh, cry or think deeply. These experiences can be shared in

real time, allowing millions to relive atrocities in hyper realistic detail as they are happening. This conversation and experience can be easily extended to the Internet and social networks with ease.

1.5 Augmented Reality Activism in the Present

AR activism finds roots in the Situationist's idea of "detournement". In detournement the artist or activist appropriates an existing media artifact and then alters it with the purpose of giving it new meaning (Boyd and Mitchell 2012). Activists do this with subversive goals, often targeting corporations and advertising. Culture jamming is a modern take on the Situationist's detournement. "Many culture jams are intended to expose apparently questionable political assumptions behind commercial culture. Common tactics include re-figuring logos, fashion statements, and product images as a means to challenge the idea of "what's cool" along with assumptions about the personal freedoms of consumption." (Boden and Williams 2002)

Some of the first AR activism was inspired by the work of culture jammers and graffiti artists who boldly created works in public spaces without permission from the establishment. Often times these messages were interventions, challenging the notion of public and private space. These activists often modified commercial messages to pointing at social injustice and political issues. Culture jamming interventions by the art activists groups like the Billboard Liberation Front remix corporate billboards to create subversive political messages (see Fig. 1.4). The process of remixing existing content is ideal for AR activism because it requires minimal effort on the part of the activist.

Logo hacking allows activists to easily target corrupt corporations and expose their misdeeds by generating subversive messages on the corporation's own logo or advertisements. This turns the corporation's own logo against them; countless logos

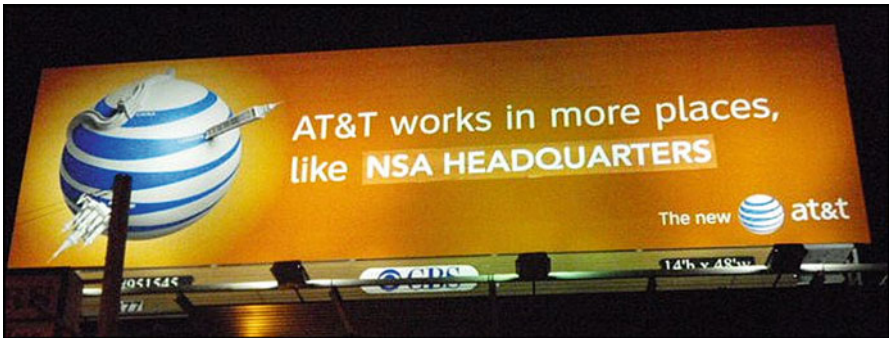

Fig. 1.4 Billboard Liberation Front, Milton Rand Kalman, *NSA_2* (Images reproduced courtesy of the artist)

Fig. 1.5 Mark Skwarek and Joseph Hocking, *the leak in your hometown*, Augmented BP logo (2010) (Images reproduced courtesy of the artist)

now act as billboards for the activist cause. The activist simply alters the target's log and or commercial image creating a subversive version of the original. The majority of the work has already been done by the activist's target. AR logo hacking is the equivalent of the Situationist's detournement with modern technology. What makes AR special from past forms of subversive media remixing is that once the logo hack has been created it affects all the logos of the target entity around the world.

"The leak in your home town" was a smartphone app which overlaid the British Petroleum (BP) sun logo with an AR broken 3D pipe with oil gushing from it. The work was in reaction to the BP oil pipe disaster in the Gulf of Mexico in the summer of 2009. During the BP gulf crisis live video feeds of the broken BP pipe at the bottom of the Gulf of Mexico dominated the media. "the leak in your home town" turned the 2d TV image into a 3D experience (see Fig. 1.5). To active the piece, viewers had to download the app and then aim their cameras at any BP logo. Once the app recognized the BP logo the same broken 3D pipe would emerge out of the BP flower. Then the black boiling smokey oil would plum violently upward. People could walk around the pipe in 360 degrees with their smartphones while watching the animated smoke. The broken pipe and smoke would appear every time they viewed a BP logo with the app. The app tied the spectacle directly to BP's corporate image. The app was the first activist work with mobile AR and is cited by World Trademark Review as the first "AR logo hack" (Smith 2010).

Fig. 1.6 The Heavy Projects, *Pirate Banker*, turns Pirates of the Caribbean's "Captain Barbossa" into Goldman Sachs CEO Lloyd Blankfein with AR (2011) (Images reproduced courtesy of the artist)

Logo hacking works because of a process called image recognition. The smartphone's camera sees the target logo, advertisement or object and then uses its position to orient digital content on top of it (see Fig. 1.6). Soon laws will be passed addressing image recognition and all the things it can affect. This will make logo hacking activist work much more dangerous. The law supporting this tech has not been passed yet so activists working in this area must work now!

1.6 Exposing the Unseen

One of AR's most powerful qualities is that it allows things which cannot be seen by the naked eye to be visible with a smartphone. Walls, doors, private property, and even national borders are easily overcome with AR. Any sort of visual or physical obstruction can be circumvented with AR and an Internet signal (see Fig. 1.7).

Google Goggles allows the public to look at an object or text with their smartphones and call up fairly extensive amount of information about it from the Internet. Using this same technology AR has the power to expose information related to corruption, pollution, and injustice that were once safely hidden behind walls, boardrooms and the like. AR cannot only tell you where to buy the consumer item in front of you but it can also let you meet the person who made it. With the

Fig. 1.7 Mark Skwarek, *arOCCUPY app*, Shows Wall Street bank bailout amounts (2011) (Images reproduced courtesy of the artist)

"Meet the MakAR" project (shown at Eyebeam's Activist Tech Demo Day) you can see and hear the worker as they build your consumer product. The app workers when the smartphone's camera is aimed at a consumer product. When the app recognizes the product it generates a real life worker who possibly made it with audio telling their story.

In the project Erase the Separation Barrier AR was used to create a large hole through the Israeli Palestinian separation barrier (see Fig. 1.8). The separation barrier is a wall that segregates Palestinians from the Israeli population. People may not move freely from one side to the other. Military checkpoints are the only gateways. To pass one must have official papers and wait in lines that can take well over two hours. For many people, life inside the barrier is all they have ever known. The Erase the Separation Barrier project allows people on either side of the barrier to look through the wall and see what was actually on the other side. For some this might have been the first time they had ever seen what was on the other side of the wall. The most recent satellites images, a topographical map, and documentation from ground level at the site of the hole were used to create an accurate model of what was on the other side of the wall. Erase the Separation Barrier is an example of diminished reality. Diminished reality removes parts of reality with AR instead of adding to reality. Future iterations of the project would updated with real time satellite feeds increasing the resolution of the experience.

Fig. 1.8 Mark Skwarek, Daz Chandler, and Ghassan H. Bannoura *Erase the Separation Barrier,* See through the Israeli Palestinian Separation Barrier with AR (2011) Screenshot (Images reproduced courtesy of the artist)

Fig. 1.9 Mark Skwarek, *Korean Unification Project,* Military structures and symbols of the ongoing Korean War are erases with AR (2011) (Images reproduced courtesy of the artist)

AR allows protesters to go virtually where they never could in reality, such as the Augmented Reality Korean Unification Project placed the first AR in North Korea by overlaying a North Korean military outpost along the North-south Korean border (see Fig. 1.9). The Augmented Reality Korean Unification Project used AR to erase symbols of war and tension that exist in North and South Korea. The work attempted to create a common ground by making a vision of a unified Korea at peace. The work makes it look as though it is not there. The Augmented Reality Korean Unification Project is another example of diminished reality. The creation of the project required

traveling to all accessible points along the North-south Korean border and erasing the military structures with AR. This included traveling into North Korea while the two countries were shooting at each other.

1.7 Cultural Loss

In the age of globalization, the history and culture of the past is often forgotten in the wake of change. The intrusion of modern pressures polarize ethnic and religious communities as the forces from the outside world threaten the homogeneity of their structure. These communities often react by isolating themselves from outsiders (White 2012). AR can serve as a historic documentation of these periods of change, a reminder of people and culture of the past. AR differs from past forms of historic documentation because it can locate the culture, events, and people of a given time in the location where they lived in the physical world, rather than in a book or archive. In the Mechanics of Place mobile art project, developed by Hana Iverson and Sarah Drury, participant Kerem Özcan addressed this issue of cultural loss on Bogazkesen Street in Istanbul, where the tensions of historical change are clearly visible. Istanbul was once known as a crossroads of the world, where people of different races and religions lived together in peace. The intermix of different religions and ethnic populations contributed to the Ottoman Empire's status as one of the world's richest cultures. A recent surge in Muslim nationalism has lead to the shunning of outsiders and their cultures. Groups outside the Muslim community are being pushed out and their presence erased. Özcan repopulated the Istanbul street with fictionalized residents – people of varying cultural backgrounds, who once made Istanbul the "melting pot" of the world.

1.8 Augmented Reality and Censorship

In 2011 Turkey banned 138 words from Turkish Internet domains. Words including "homemade," "hot," "nubile," "free" and "teen" were part of the censorship campaign against anything insulting to Turkishness and political extremism (Senerdem 2011). Some saw this as part of a crackdown and tightening of religious intolerance by the Turkish government. Petek Kizilelma and Hana Iverson took on Turkey's 'forbidden words list' with an AR work that used the words as graffiti in the streets of Istanbul.

Tamiko Thiel's work "Shades of Absence: Governing Bodies" addresses censorship by government officials in the art world. Thiel puts golden silhouettes of censored artists inside the walls of the Corcoran Gallery of Art – including Robert Mapplethorpe, whose planned 1989 show The Perfect Moment was cancelled by the museum's director in a preemptive act of self-censorship. Conservative members of Congress had called Mapplethorpe's work "obscene." (Katz 2009)

1.9 Augmented Reality for Protest

Possibly one of the most widely known and discussed AR activist protests was the #arOCCUPYWALLSTREET (#arOWS) intervention at Wall Street (see Fig. 1.10). #arOWS was the occupation of the New York Stock Exchange (NYSE) and Wall Street area with AR by activists from around the world. #arOWS was a AR component of the #OCCUPYWALLSTREET (OWS) movement. # arOWS was started at the beginning of the OWS movement and has continued to participate in OWS events ever since. #arOWS was inspired by OWS's inability to protest at or near the NYSE and Wall Street area. Instead protesters were forced to camp blocks away at Zucotti Park where they ended up creating the Occupy Camp. Wall Street was all but closed off to local foot traffic and occupied by the New York Police Department around the clock during the OWS movement at Zucotti Park. Police were on heightened alert and protesters were strictly prohibited from entering the NYSE area. Those who did faced being detainedand possibly arrested if they attempted to do so. As it later turned out, the FBI had treated the OWS movement as terrorists (Estes 2012).

#arOWS was the first organized mass protest using AR as a tool to project the global community's voice to a highly contested location. Over 25 artists from

Fig. 1.10 *#arOCCUPYWALLSTREET,* Global AR protest in front of the NYSE, (2011) Screenshot (Images reproduced courtesy of the artist)

around the world participated in the event covering the Wall Street area with over 400 protest related augments. At Wall Street AR excited a new group of the global community about the OWS movement. Many of whom would not be able to reach Wall Street due to real world obstacles such as distance and travel costs. These people created messages and protest works that were seen heard from Wall Street to the other side of the earth. #arOWS was organized by Mark Skwarek whose stated goal was to use AR technology to get more people to come out and participate in the OWS movement. #arOWS showed power or AR technology to deliver the activist's message to Wall Street's front doorstep even though the FBI and police had spent millions and millions of dollars trying to stop them. AR was able to overcome their surveillance, barricades, horses and excessive police numbers.

One of the iconic works of #arOWS was the ProtestAR app. The app took the protesters from Zucotti Park and placed them directly in front of the NYSE. The app was created from pictures and audio taken of the Occupiers and their messages. The Occupiers were cut out of the pictures using image editing software. The cut outs were turned into virtual AR images and placed in front of the NYSE along with recorded sound bytes made by the protesters. Organizers of #arOWS went to the forbidden protest zone in front of the NYSE on almost a daily basis and would show the public the augments on a tablet. ProtestAR allowed the occupiers to protest in front of their specified target, the NYSE and be heard.

An interesting comparison between activists working in the physical and those working with AR can be made with AR "Money Grab" by Todd Margolis, and "Reign of Gold" by Tamiko Thiel on one hand, with the physical intervention "The Day the NYSE went Yippie" by Abbie Hoffman and Jerry Rubin on the other. All of the works were activist interventions that had money falling over the NYSE. In 1967 Hoffman and Rubin staged an intervention inside the NYSE and threw handfuls of real money from a balcony onto the traders on the stock market floor. In 2011 Margolis and Thiel made AR money rain continuously over the NYSE. Both events were well documented and were written about in the press allowing for the AR experience of falling money to be compared to the physical one. To have seen both the physical and AR works the viewer had to be present at the NYSE. The physical intervention of Hoffman and Rubin was short lived because they were detained almost immediately after starting. The work certainly provoked a reaction from the day traders who witnessed the event. "Some of the brokers, clerks and stock runners below laughed and waved; others jeered angrily and shook their fists." (Ledbetter 2007).

Very few, if any of the general public witnessed the intervention because it happened behind the closed doors of the NYSE. Their work was successful because news press was there to capture and write about the event. In contrast Margolis and Thiel's works were seen by many of the public (including day trades) who were walking around the NYSE at random times. We do not know if the traders inside the NYSE witnessed the falling money but many were aware of the work. The AR money never stopped falling so the event is still ongoing and documented to this day. When comparing the physical to AR, it's very hard to beat the emotion of being under real falling money with AR. This difference is a major divider of the physical

and AR interpretations of the intervention. Could the effect have been duplicated with AR? Yes... Margolis and Thiel could have linked their AR money to actual currency like Bitcoin that viewers could have collected. This could have generated the similar excitement and personal investment of Hoffman and Rubin's work. Both approaches received news press largely because of their novelty. In the end it was the press which brought the events to the global public's attention.

1.10 Augmented Reality Flash Mobs

At the height of the #arOWS protest a call went out on the internet for the general public to converge on the New York Stock Exchange in the form of an AR Flash Mob (see Fig. 1.11). Critics of the #arOWS movement said that the people who needed to see the AR protest in front of the NYSE [those working in the NYSE and the general public passing by] were basically unaware that it was even taking place. The protest was invisible to the naked eye. To view it one needed to have a mobile device with the correct app installed. The goal of the flash mob was to overcome the AR technology barrier and get it seen and in the hands of the public. On Nov 12, 2011 a group of seemingly ordinary citizens converged on the NYSE armed with smartphones and tablets. Participants were asked to dress in plainclothes which would not identify them as members of the OWS movement because of the heightened police security. Participants were told to find a spot along the metal NYPD barricade that surrounded the NYSE. The goal was to surround the barricade and NYSE with AR flash mobbers. Participants were told to face their smartphone or tablet displays so that the public walking by could see and hear the AR protest. At exactly 4:00 [the beginning of quitting time for NYSE workers] around 30 people had surrounded the NYSE. With their displays facing the public they loaded the arOCCUPYWALLSTREET app and turned up their volume. Hundreds of people able to see and hear the #arOWS protest on that day (many of whom were NYSE workers) because of the high volume of foot traffic and timing.

Fig. 1.11 *#arOCCUPYWALLSTREET, Augmented Reality Flash Mob at Wall Street,* AR flash mob in front of the NYSE, (2011) (Images reproduced courtesy of the artist)

1.11 Augmented Reality Distributed Action

#arOCCUPY May Day was the occupation of the planet earth by AR activists from around the globe on May 1st (see Fig. 1.12). The event was part OWS's May Day general strike which called for people around the world not to show up for work and to participate in a global strike. AR activists performed a "distributed action" in which they collaborated from across the globe to occupy the earth with AR. The project was organized by an open call that was posted on public websites and forums across the internet. Activists from around the world participated creating work(s) related to OWS. The works were shared with all those participating and combined into a mass AR protest. The mass AR protest was distributed across the globe at the location of each participating activist as well as people from the general public who were willing to participate. On May 1, 2012 the AR activists and public were instructed to view and show the protest to others. As they did so they were told to take pictures and video which they were to posted to their social networks. The first images posted came from Australia and then Japan. As the day went on excitement grew to see what country would be next and who could get the best image. Over 20 countries and 42 artists from around the world contributed to the

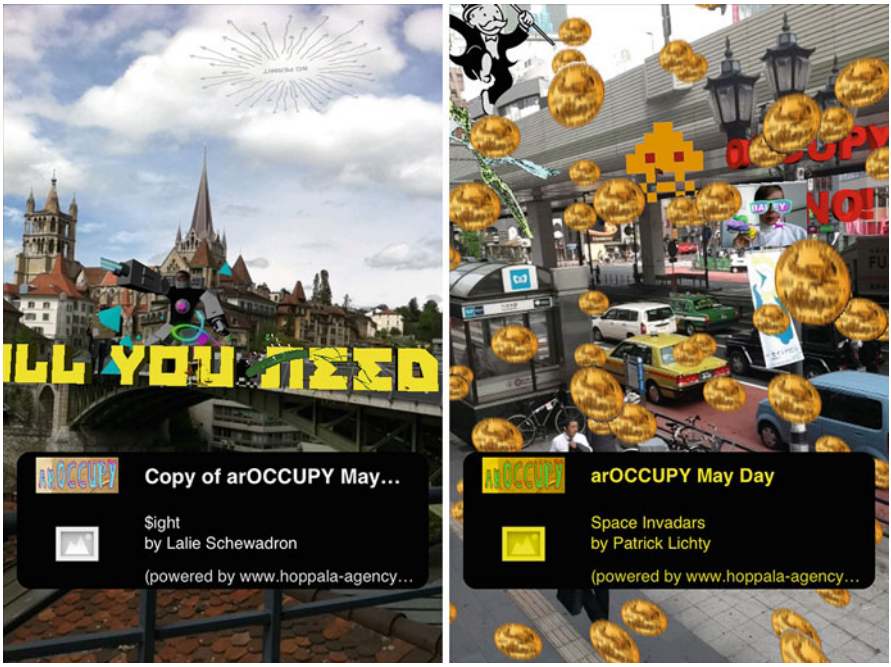

Fig. 1.12 *#arOCCUPY May Day,* Switzerland [L] Screenshot (Image reproduced courtesy of Lalie Schewadron), Tokyo, Japan [R] (Image reproduced courtesy of Yuichi Irimoto) Screenshot (2012)

effort. The event engaged the public on the ground as well as the social network. The #arOCCUPY May Day was organized in sync with the OWS's May Day Arts Council and Devotion Gallery located in Brooklyn, New York.

1.12 Augmented Reality Environmental Activism

Nathan Shafer was one of the first activists to work on environmental issues with AR. Shafer replaced parts of the environment that had disappeared during the last century with mobile AR. One of Shafer's first works addressing environmental loss was his work that brought back the aurora borealis to his hometown of Anchorage Alaska (see Fig. 1.13). As part of the sun's cycle every 11 years it goes from a

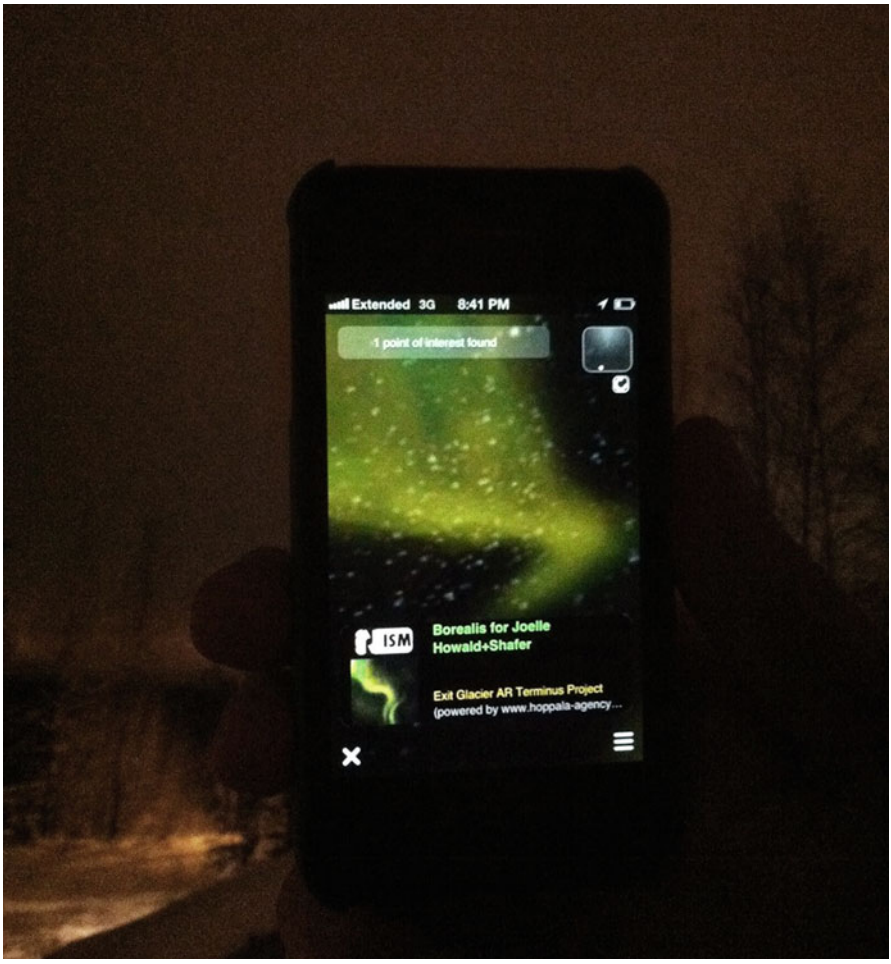

Fig. 1.13 Nathan Shafer, *Borealises*, (2010) Full view (Images reproduced courtesy of the artist)

Fig. 1.14 Nathan Shafer, *Exit Glacier Terminus Project* (2012) Screenshot (Images reproduced courtesy of the artist)

state of high activity to low activity. As it goes into the low activity cycle it emits less highly-energized particles into space. When the energized atoms collide with Earth's atmosphere they create the aurora borealis effect. In the low cycle the aurora borealis moves north and is seen much less frequently (Bodzash 2010). Even when the sun was in a period of high activity and the aurora borealis is not visible in Anchorage because of man made light pollution. This light pollution removes the aurora borealis from cities across the world.

Another of Shafer's works addresses global warming and environmental degradation (see Fig. 1.14). This was seen in Alaska's rapidly receding glaciers. Shafer used AR to show on site, how the glacier had receded over recent years. Viewers have to travel to the site of the glaciers armed with a smartphone or tablet. Viewers can then see glaciers as they were years ago. The app allowed viewers to roll back time year by year to see global warming's devastating effect on what's left of the glaciers. Shafer's work shocks the viewer when confronted with the extent of the devastation. The amount of the damage brings on a sense of urgency bordering on hopelessness when the viewer is faced with Shafer's documentation.

Art activist John Craig Freeman's work "DéchARge de Rebut Toxique"12 (see Fig. 3.6) creates a sprawling radioactive toxic waste dump across the city of Paris, France. The work calls into question the world's reliance on nuclear energy and the consequences tied to long term use.

1.13 Augmented Reality Monuments

Author activist Gregory Ulmer writes of the need for modern monuments to reconcile the tragedies and horrors of today. Because we as a society experience these as a networked collective there is a need for a modern day monument which reflects this. In his book Electronic Monuments Ulmer argues that this monument is needed for the 911 World Trade Center Disaster. Artist activist Brian August created this very

monument for World Trade Center called 110 Stories. August made an AR app that recreated the World Trade Center at the real world site of ground zero in scale. The app allowed viewers to see the trade center from across the city of New York replacing its iconic silhouette in the Manhattan skyline. Then August created an interface which allowed viewers to retell their memories of the Trade Center and leave them at the location where they had the memory. The work linked memories in time to physical locations throughout New York City with AR. The memories were stored in a collective database that the community could review from the app and Internet.

1.14 Extreme Augmented Reality Activism

Extreme AR activism is work that pushes the edge, where real danger is involved. The activist's message usually deals with controversial subject matter. These works are often executed in politically dangerous locations. Being caught making or viewing the work could result in fines, blacklisting, deportation, jail or worse. Some activists are willing to take these chances because this type of work usually has the best chance of creating actual change.

Work by the group "The 4 Gentleman" push these boundaries by creating works that could get the viewer jail time simply by being caught viewing the mobile app (Fig. 1.15). One work by the group, "Tiananmen Squared" recreates the Goddess of Democracy statue from the Tiananmen Square uprising in Tiananmen Square in Beijing, China. Anyone who is brave enough can travel to Tiananmen Square and view the work. Chinese college art students originally erected the Goddess of Democracy statue with chicken wire and plaster of Paris during the uprising. By simply searching for the term "Tiananmen Square" while in China, the searcher is red flagged and put under observation by Chinese cyber-police. Currently AR is very low on most government's radars. The data being transmitted it is often overlooked by big brother. This will surely change along with escalating dangers associated with this type of work in the upcoming years.

The Apple Store Intervention with Foxconn Worker (shown at Eyebeam's Activist Tech Demo Day) can be classified as AR spectacle activism (Fig. 1.16). The Foxconn employee's lifeless body is seen contrasted against the polished glass atrium of the 14th street Apple Store with augmented reality. Foxccon Apple's largest manufacturer had a string of suicides – employees jumping from the roofs of the factory buildings. Eventually Foxconn, to protect its employees was forced to installed safety nets surrounding these buildings to dissuade would be jumpers. The work appropriated a shocking leaked image of one of the real world Foxconn employees who had just committed suicide. The work creates a telepresence by mixing the realities Apple Store with the tragedy that took place at the Foxconn Plant. The lifeless Foxconn worker is surrounded by first responders and onlookers from the Foxccon plant. This is contrasted by the Apple store consumers who walk by the tragedy, unknowing and without care as they prepare to make their next Apple purchase. In a future iteration of the project the

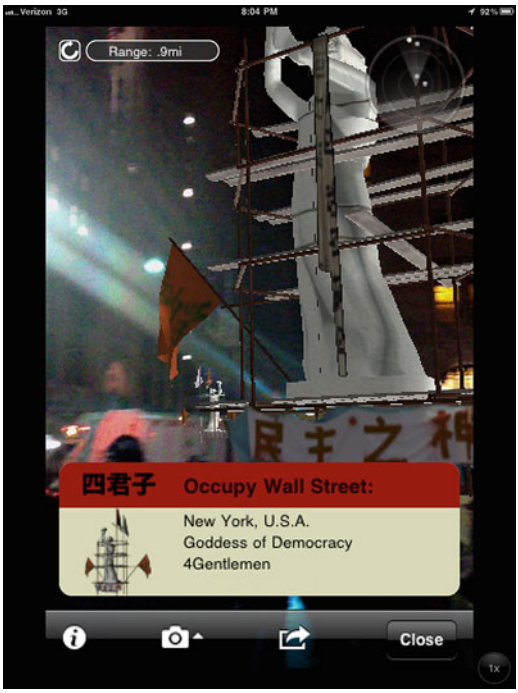

Fig. 1.15 The 4 Gentleman, *Goddess of Democracy* (2011) Screenshot (Images reproduced courtesy of Mark Skwarek)

Fig. 1.16 Mark Skwarek, *Apple Store Intervention with Foxconn Worker,* (2012) Screenshot (Images reproduced courtesy of the artist)

app will be subversively installed on the Apple Store's floor model iPhones so that the unknowing consumers may accidentally experience the intervention while considering their next smartphone purchase.

1.15 Augmented Reality Communication and Creation

Another form of AR activism empowers the public itself with creative tools. These tools allow the public to make their own AR messages at specific geographic locations. These locations are often highly political or private corporate locations which are inaccessible to the general public. The app infiltrAR allowed people to tweet messages directly into the U.S. Presidential Oval Office via an AR hot air balloon (Fig. 1.17). If the President turns on the app he will see the balloon floating around the office, delivering the last tweeted message. It's important to note that this message can only be seen at the White House. People using this type of app will see messages or creations made by other people. The activist's goal

Fig. 1.17 Sander Veenhof and Mark Skwarek, InfiltrAR, AR balloon sends tweets to the oval office, (2012) Screenshot (Images reproduced courtesy of the artist)

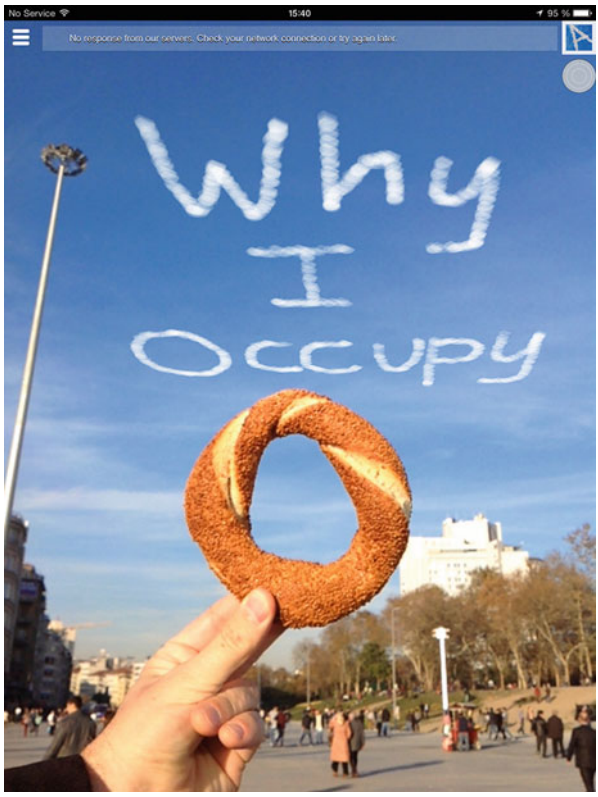

Fig. 1.18 Will Pappenheimer, *Skywrite,* Create AR messages with clouds, (2012) (Images reproduced courtesy of the artist)

is to make the creation process simple enough that anyone with a smartphone can create and broadcast their messages with minimal effort. Creation software is made to democratize AR technology and empower the masses.

These AR mobile apps rely on the public to create the message or idea. This type of work is called crowdsourcing. They rely on the users to create the message. These projects are often popular because of the creative freedom it provides the public. The activists who make the software can never know or control what the public will create often leading to unexpected results.

The more successful creation apps generate strong metaphors, often giving the public power to remix known experiences from the real world. Skywrite by Will Pappenheimer, allows the public to draw AR clouds in the sky with a smartphone or tablet (Fig. 1.18). A person using the app looks at the sky with their mobile device and draws on its display with their finger. As they do so a cloud appears and the sound of an airplane can be heard. Skywrite could be used in a countless number of ways form art creation to love letters. Pappenheimer creates context to the work by choosing specific locations that people can create messages above. On a number of occasions Skywrite has been placed over political and corporate locations such as the U.S. White House, the U.S. Capitol Building, and Apple and Facebook's

headquarters. The placement of the experience turns most average citizens into activists when asked to draw something above a strategic government building such as the White House.

1.16 Negative Aspects of Augmented Reality

As with every new technology, there has been a backlash against the use of AR for activist purposes. A recurring point of contention is that the technology masks the evils of the world and that it detaches society from reality. "Against those who claim that augmented reality is the future of activism, we need only say: Everyone may wear blinders but the world will still stink of decay." Micah White (2010). The activist response to White is that we never set out to mask the stink and decay of the world; instead we set out to expose it and bring people out of their homes, to it. AR has the power to reveal the unseen. White misunderstands the technology. Ironically, White's blog text alienates the public from themselves and the real world their monitors. The act of creating a dialogue which solely exists in a net based format only fuels societies' detachment from reality. The time spent reading is time taken from the real world. Instead we (AR activists) set out to expose the real world and all its faults to new audiences who are trapped behind White's computer monitor and reveal to them the unseen horrors of the physical. AR can make digital activism engage the physical world. AR can heighten the public's understanding of their physical surroundings making them more in touch with the world around them. We live in a day and age where startling numbers of people communicate more and more through social media such as Facebook and Twitter. AR activists should turn these technologies into face-to-face experiences that take place in the real world. The goal of future activists working with AR should be to liberate the masses from their computers and get them excited and engaged in the real world by talking to each other! Not all having the same app or fancy smartphone, but using app to generate discussion and community.

Other critics of the technology dislike AR as a tool for activism because they say it is a "safe" medium that is created from behind a monitor and keyboard. They see this technology creating a generation of armchair activists, protesting from the comfort of their homes completely detached from the physical yet complacently satisfied they have fulfilled their obligation in the fight for social justice. Creating a generation of activists who show up at the protest as virtual avatars with digital protest signs made up of one's and zero's. "[AR] absolves 'participants' of some of the basic requirements of a traditional protest [like] showing up, getting hassled [and] offering oneself for arrest," – Carl Skelton (Chen 2012).

Skelton's fears are grounded in the writing of the Situationists and Guy Debord. "All that once was directly lived has become mere representation." The spectacle is the inverted image of society in which relations between commodities have supplanted relations between people, in which "passive identification with the spectacle supplants genuine activity". "The spectacle is not a collection of images,"

Debord writes, "rather, it is a social relationship between people that is mediated by images." Guy Debord (Debord and Nicholson-Smith 1967/1994)

These critics bring up important issues but misunderstand AR as a medium. People have to travel to specific locations to experience almost all current AR activism whether the work is rooted in gravitas or humor. The site-specific quality of AR allows it to leverage a new untapped demographic of potential protesters. These could be tech savvy people who disagree with the state of national policies but aren't quite motivated enough to go to the protests. The lure of AR could be the carrot that could motivate these people into making the effort to travel to a protest. Once there they would meet the like-minded people and hopefully become more involved. In this sense AR has the ability to help build the movement's numbers. Both White and Skelton make very important arguments that future activists working with AR should consider carefully. Some future works will undoubtedly fit the mold that White and Skelton's have predicted. Activists should work to see that these predictions do not come true.

Another argument against the use of AR for activism is that it is a technology of the elite. They say it requires an expensive device and normally a year long contract. When smartphones first became available to the public, this was the case but the industry has their eyes on the untapped global market. This market is not in developed countries but instead in third world nation states. "The big opportunity is in how we put smartphones into the hands of the next billion," says Dan Appelquist, Open Web Advocate at Telefónica Digital. "And we do not believe that the situation we currently see with smartphones in developed markets will necessarily be replicated as this happens." (Carter 2013)

The first cell phones appear ridiculous to us now. They were unwieldy and completely unrealistic for the general public. The upfront costs to develop for an AR mobile device have previously keep many activists out of development.

Finally the vast majority of the general public simply has no idea what AR is.

Lack of knowledge and understanding of the software separates not only the activist creator but also the public from the experience. The transition from smartphones to glasses will usher in exponential growth in the public's understanding of the technology. The general public who is bombarded with content everyday filters AR out.

1.17 Dangers Facing the Digital Activist

The dangers facing AR activists have changed along with the technologies they use. In the past activists had to worry about being caught in the real world. This included being recorded by a surveillance camera, being infiltrated by undercover agents, entrapment, charges of destruction of property and vandalism to name a few. Today police cars can automatically scan each car's license plate and security cameras make use of facial recognition algorithms to determine who you are and then search your online profile automatically for any wrong doing. The tools of science fiction

are becoming real and they are in the hands of the political and financial elite. For those working with AR the simple act of viewing an augment can leave a digital fingerprint that points straight back to you. In January 2014 the Ukrainian government used protester's cellphones to determine which people were near a protest and sent them a text message saying, "Dear subscriber, you are registered as a participant in a mass disturbance." A new Ukrainian law makes participating in a protest the same offense as a violent crime, punishable by imprisonment (Kramer 2014).

The technological infrastructure that our society now relies on is a system that can be easily monitored and recorded by the U.S.'s intelligence organizations (NSA, CSS, NRO, etc.) and many other nation states around the world. Edward Snowden made the darkside our technology painfully clear. The utopia we came to believe in was actually under the close eye of big brother in most likely the largest case of surveillance in the history of mankind. The U.S. government was able to force corporate giants like Google, Facebook, Apple, AT&T and Verizon to give access to their systems and their customer's private information (Savage et al. 2013).

This surveillance directly affects activists working with mobile AR because the infrastructure it's built on top of, in most cases, relies on corporations such as AT&T and Verizon. Activists working with any of these major providers should assume their data is being monitored by the NSA and possibly other entities. Because AR is a new technology, it largely falls off the elite's radar. But that will change in the near future as AR becomes more commonplace. When activist actions affect the political and corporation's wealth and power they will crack down. That time is coming soon. Juniper Research says that between 2012 and 2017 AR sales will grow from $82 million to 5.2 billion (Johnson 2012).

With all of these variables facing the AR activist what options are left to create work that will have a real impact on society? This type of work will undoubtedly involve risk. Ways to minimize this risk would start with the foundation upon which the activist builds. This foundation is made up of the networks which the activists message is broadcast across. Activist sites like Wikileaks use The Onion Router (TOR) to anonymize their communications with their users. There is other similar software such as Free Net allow users to browse the net, chat, publish, and share files anonymously. There is always a tradeoff to anonymity these softwares provide. Currently small numbers of people use these encryption softwares and when they do so it is usually for a reason. Because of the small numbers of people it is easy for government agencies and other interested parties to spot them out of the billions of daily communications.

1.18 The Future

What can AR of the future do to aid activists and create real social change? Streaming real time information visualizations to activists and the public has great potential to aid activists, inform the public and create change. Modern day activist

heroes Edward Snowden and Julian Assange's whistleblowing are seen by many as leading the way for modern day activists. A powerful use for future AR activists would be mixing Snowden's information with Anonymous's hacktivism to create a real time AR visualization of corruption and injustice. Not just the idea of being spied upon but being able to see it as it's happening. This would take Snowden's revelations to another level. Groups like Anonymous could hack live data streams of the political and corporate elite's wrongdoing and turned them into real time AR visualizations that could be seen around the world. An example is the prototype The Protester's Survival App which was developed during the OWS Movement. The work was made in reaction to the H.R. 347 bill and the Trespass Bill of 2011. They stated that if certain locations were entered by protesters, they could receive a 10 year jail sentence. The problem was these locations were invisible and could move without warning. Being at the wrong place at the wrong time could equal a long jail sentence. The Protester's Survival App and AR made these locations visible. This type of application not only keeps activists out of jail but it saves taxpayers a costly legal process.

Another area that shows great promise for AR as a tool for activism is the further development of AR creation apps (discussed in Sect. 1.15). AR creation apps democratize AR by giving the public a tool which they can use to create their own message or idea. Allowing the public to create "anything" with very little effort is the ideal for crowdsourcing. Harnessing the combined creative power of the public is a very powerful thing allowing an activist to create incredible amounts of work that one person could not possibly do on their own. The collective consciousness of the public makes it possible to generate a wide range of ideas allowing the group's overall message to stay fresh, unique and unexpected. An example app is CreatAR15 (see Fig. 4.3). CreatAR allows people to make anything with AR anywhere simply by downloading the app and asking for it. People can create and edit whatever they want wherever they want as well as upload their own creations.

In the future activists will be able to record and leave historical events where they happened in HD 3D along with sound. They will have the ability to fast forward and rewind time on site and share it instantly around the world. This will be just one of many consumer grade tools available to the future activist. The science fiction of today is quickly becoming the freeware of tomorrow. Activists need to be ready to utilize this technology as it becomes available.

1.19 Closing

Where does the activist's responsibility lie? At what point is he or she to be held accountable when something goes wrong? Difficult questions face activists working with AR. Being able to view the work anywhere by a rapidly growing population can be a danger. Creating works in locations which could jeopardize the safety of the person(s) viewing the work has become very very easy. This can be done with a great degree of anonymity and literally a few clicks. To achieve the same result

in the real world activists normally do extensive planning and could be risking their own lives. The creators of activist work must be held accountable for their actions. The AR of tomorrow will be considerably more powerful, easily accessible to a much larger population, and if abused more dangerous.

AR is a very young technology that has a real chance to change the world. The ability to overlay reality with the virtual is a pandora's box that will certainly be used by both sides. It has an uncertain future and development will be largely driven by commercial interests.

Until AR is able to create actual social change it will continue be attacked by nay sayers like Micah White. People are just beginning to figure out what makes AR a unique technology. It offers the activist one of the most powerful tools of expression available. As AR rapidly evolves it will quickly become more useful. Activists should carefully consider the work they will make and its desired impact on society. How will their work reach the public and who are they trying to affect? What are the long-term implications and possible outcomes, right or wrong? The future AR activist's goal should be to create work that mobilizes people, liberating them from their digital screen based realities making a stronger community and creating real social change.

Alice has stepped through the looking glass and we aren't turning back. Emerging mobile technologies such as the smartphone and Google Glass are here to stay. Many will use these technologies in ways that can isolate and fracture society. It is the job all future artists and activists to use this technology for the better, to bring people together and uproot social injustice.

Acknowledgements Mark Skwarek (with Alan Sondheim and Brenda Grell).

References

Andrews E. 11 things you may not know about ancient Egypt. History.com, http://www.history.com/news/history-lists/11-things-you-may-not-know-about-ancient-egypt (2012). Accessed 29 Nov 2013.

Barnett E. Public projection. fans in a flash bulb, http://fansinaflashbulb.wordpress.com/2009/03/10/public-projection/ (2009). Accessed 25 Nov 2013.

Bell M. Occupy the Tundra, Antarctica: protests spread to 951 cities, thanks in part to viral photos online. Washington Post, http://www.washingtonpost.com/blogs/blogpost/post/occupy-the-tundra-antarctica-protests-spread-to-951-cities-thanks-in-part-to-viral-photos-online/2011/10/17/gIQAIU9LuL_blog.html (2011). Accessed 18 Nov 2013.

Boden S, Williams J. Consumption and emotion: the romantic ethic revisited. Sociology, http://www.sagepub.com/mcdonaldizationstudy5/articles/Consumption_Articles%20PDFs/Boden.pdf (2002). Accessed 5 Jan 2014.

Bodzash D. The northern lights are disappearing. Examiner.com, http://www.examiner.com/article/the-northern-lights-are-disappearing (2010). Accessed 29 Nov 2013.

Boyd A, Mitchell D. Beautiful trouble: a toolbox for revolution. New York: OR Books; 2012.

Carter J. Why basic smartphones will win in the race for 'the next billion' users IN DEPTH Is Nokia onto something? Tech Radar, http://www.techradar.com/us/news/phone-and-communications/mobile-phones/why-basic-smartphones-will-win-in-the-race-for-the-next-billion-users-1145720 (2013). Accessed 21 Dec 2013.

Chen H. Text, reply, now occupy. Washington Square News, http://issuu.com/nyu.news/docs/wsn012312/4 (2012). Accessed 17 Dec 2013.

Critical Art Ensemble. Electronic civil disobedience: and other unpopular ideas. New York: Autonomedia; 1997.

Debord G, Nicholson-Smith D. The society of the spectacle. New York: Zone Books; 1967/1994.

Estes A. The FBI treated occupy like a terrorist group. Yahoo News, http://news.yahoo.com/fbi-treated-occupy-terrorist-group-021450389.html (2012). Accessed 5 Jan 2014.

Johnson L. Augmented reality apps predicted to generate $300M in 2013: study. Mobile Marketer, http://www.mobilemarketer.com/cms/news/research/14159.html (2012). Accessed 20 Dec 2013.

Katz J. Imperfect moments: mapplethorpe and censorship, twenty years later. http://www.icaphila.org/news/pdf/mapplethorpe_pr.pdf (2009). Accessed 7 Jan 2014.

Kramer A. Ukraine tracks protesters through cellphones. New York Times, http://mobile.nytimes.com/2014/01/22/world/europe/ukraine-protests.html?_r=0&referrer= (2014). Accessed 21 Jan 2014.

Ledbetter J. The day the NYSE went Yippie, Forty years ago, Abbie Hoffman and friends invaded the heart of American capitalism and sprinkled dollar bills on the exchange floor. Did it make a difference? CNN.com, http://money.cnn.com/2007/07/17/news/funny/abbie_hoffman/CNNMoney (2007). Accessed 20 Dec 2013.

Savage C, Wyatt E, Baker P. U.S. confirms that it gathers online data overseas. New York Times, http://www.nytimes.com/2013/06/07/us/nsa-verizon-calls.html?pagewanted=all&_r=0 (2013). Accessed 10 Dec 2013.

Şenerdem E. TİB's 'forbidden words list' inconsistent with law, say Turkish web providers. Hürriyet Daily News, http://www.hurriyetdailynews.com/default.aspx?pageid=438&n=tibs-forbidden-words-list-inconsistent-with-law-2011-04-29 (2011). Accessed 3 Jan 2014.

Smith A. International – trademark owners beware: augmented reality can pollute your brand. World Trademark Review, http://www.worldtrademarkreview.com/account/registerv2/RegisterFree.aspx?ReturnURL=http%3a%2f%2fwww.worldtrademarkreview.com%2fdaily%2fdetail.aspx%3f%3d6F7E9886-3A5F-4783-A028-320B8518FD5A (2010). Accessed 29 Nov 2013.

White M. Augmented reality, replacing imagination with computer animation. adbusters, https://www.adbusters.org/blogs/blackspot-blog/augmented-reality.html (2010). Accessed 14 Dec 2013.

White J. Muslim nationalism and the new Turks. Princeton: Princeton University Press; 2012.

Yochelson B, Riis J, Czitrom D. Rediscovering Jacob Riis: exposure journalism and photography in turn-of-the-century New York. New York: New Press; 2007.

Chapter 2
Critical Interventions into Canonical Spaces: Augmented Reality at the 2011 Venice and Istanbul Biennials

Tamiko Thiel

2.1 Introduction

> In the 21st Century, Screens are no longer Borders. Cameras are no longer Memories. With AR the Virtual augments and enhances the Real, setting the Material World in a dialogue with Space and Time (Manifest.AR 2011).

In 2011, using the recently developed mobile technology of geolocated augmented reality (AR), the author was the primary organizer of two interventions into art biennials: in Venice together with Sander Veenhof and Mark Skwarek for our cyberartist group Manifest.AR (Manifest.AR blog 2013) and in Istanbul in collaboration with the Istanbul design team (PATTU 2013). With geolocated AR artists can place virtual computer graphic artworks at specific locations via the site's GPS coordinates. The artwork can then be viewed by anyone on site in the display of a smartphone or mobile enabled tablet as an overlay on the live camera view, merged with the surroundings as if the artwork was there in real life.

Both Venice and Istanbul – bound together through centuries of often contentious history – are spectacular cityscapes and sites of former empire. They continue to fascinate not only for their spectacular settings and artifacts of their past glory, but also for their cultural presence in the globalized contemporary art world. The Venice Biennale, founded in 1895, is the world's oldest art biennial and arguably the city's main claim to relevance as a contemporary international destination. Istanbul, long in decline after the fall of the Ottoman Empire, has been reinvigorated in the past decades by Turkey's rising political and economic power. Its art biennial, founded in 1987, is a showcase for Istanbul's new position as a dynamic center of contemporary international culture.

T. Thiel (✉)
Artist and Manifest.AR co-founder, USA, DE, JP
e-mail: tamiko@alum.mit.edu; http://www.tamikothiel.com

V. Geroimenko (ed.), *Augmented Reality Art: From an Emerging Technology to a Novel Creative Medium*, Springer Series on Cultural Computing,
DOI 10.1007/978-3-319-06203-7_2,

In both interventions the curatorial questions were the same: How can we go beyond each city's glorious past to address its contemporary concerns and the reality of life in the city today? What role does the art biennial play in the political and cultural life of each city? Can we use the interventions to question the biennial system itself, and the art world's use of that system to define and establish artistic value?

2.2 Challenging and Exploiting the Primacy of Site

The Manifest.AR artist group originally formed around an intervention into the United States' most iconic contemporary art space: the Museum of Modern Art in New York. Sander Veenhof and Mark Skwarek realized that the institutional walls of the white cube were no longer solid, and organized a guerilla exhibit of augmented reality artworks inside the walls of MoMA.[1]

Since time immemorial location has been used to consecrate objects and people. The religious and power centers of the world maintain sacred spaces where only the chosen elect are allowed to enter. In the art world too, access to a location – a gallery, a museum or other curatorially closed space – is tightly controlled to confer value and thus, via this exclusivity, to canonize the works shown there as "high art." What does it mean however to control physical space when in geolocated virtual space anyone can place whatever they want? (Aceti 2008). Augmented reality artists require no permission from government or artistic authorities to place their works at a specific site. They merely need know the GPS coordinates of the location – and unlike Street Art or other physical art interventions, the infiltrated institutions cannot remove the works, which remain on site as long as the artist wishes.

Technically, it is a trivial difference in GPS coordinates that moves a virtual object from a public space such as Central Park to the curatorially closed space inside the sacred walls of MoMA. As long as curators are gatekeepers for locations of high art, location still confers value – and placing AR works in such a location, even or especially if put there by the artists themselves in subversion of this control, endows the works with the aura of objects canonized by that location.

The epiphany of augmented reality, however, is that although the artworks are virtual, their presence at the site is "real": "actually existing as a thing or occurring in fact; not imagined or supposed" (Oxford English Dictionary 2013) – and is reproducible by anyone who views the artwork at that site. In this "consensual

[1] In October 2010 Sander Veenhof and Mark Skwarek organized the AR intervention "We AR in MoMA" (Veenhof 2010) for the Conflux Festival of Psychogeography (Conflux Festival 2010). Cyberpunk author Bruce Sterling blogged the intervention on WIRED (Sterling 2010), MoMA tweeted "Nice, looks like we're havin an 'uninvited' AR exhibition tomorrow!" (Museum of Modern Art 2010), and later in an interview with the New York Times the director of digital media welcomed our engagement with her museum (Fidel 2010).

hallucination" that was the dream of the early cyberpunk authors and virtual reality evangelists (Gibson 1984), augmented reality is redefining the barriers between what we consider "the real" and "the virtual."

Human culture has always been fascinated with the invisible, whether these were gods and supernatural spirits that could only be seen via divine grace, or remote galaxies and tiny organisms that could only be seen with scientific instruments. Both individuals and entire societies invest sites with invisible layers of meaning as a part of personal and collective memory. Augmented reality art can now merge these invisible layers of memory and culture with the actual physical location. As with all site-specific artworks, viewers can also record their own personal encounters in screenshots, creating a dialogue between the work, the site and their own particular gaze.

In 2011 when we did these interventions there were still voices that spoke of smartphones as elitist devices for the wealthy. Even then however our social lives had already moved into virtual space: we shared experiences by posting our photographs on the Internet, and the small incidents and passing thoughts of our daily lives on Facebook and Twitter. Now, less than 2 years later it is clear that soon more people worldwide will be using mobile devices than PCs, and smartphones will become our main access platform to the digital commons (Standage 2012). What is the likelihood that kids in East Harlem[2] or people of all ages in Kenya (Talbot 2012) will view AR art on smartphones versus viewing art in galleries and museums?

2.3 Site as Canvas and Context

As interventionist art, augmented reality questions the possession and control of a physical space. As site specific art, it also exploits and appropriates the physical space as its canvas and its context, as the virtual artworks are always seen merged with the live camera view of the surroundings. It enters into a dialogue with the location visually to integrate it into the visual composition of the viewed augment, conceptually to trigger associations of memory and culture, but also physically as the viewer interacts bodily with the site. Usually the viewer must search the surroundings to find the augment, like bird watchers scanning with binoculars, or must walk the site dodging real world obstacles in order to experience the artwork in its totality. Thus, though the artwork is virtual, the viewer must engage physically

[2]In 2012 the author helped the Caribbean Cultural Center and African Diaspora Institute (CCCADI) to bring in a Rockefeller Cultural Innovation Grant to create "Mi Querido Barrio," an augmented reality tour of the history and art of East Harlem. As AR Artistic Director for the project the author is conducting AR workshops for artists in East Harlem (Rockefeller Foundation 2012; CCCADI 2012).

with the site to experience it – an act which engages the kinesthetic sense of the viewer's body and thus situates the viewer and the act of viewing in the physical experience of that site.

Our interventions into art spaces and events are thus instigated by the visual, cultural and physical facets of experience that the site provides for the artwork as canvas and as context, with an express interest in the dialogues – in the art world and beyond – that engage the site. Many of our works dialogue directly with the other "official" artworks at a venue, and inevitably also with the theme and concept of the exhibition as defined by the curator. Many artists act on and react to contemporary events and discourses, of course, but the ability of augmented reality to geolocate artworks at the site of those discourses increases the potency of their visual argument.[3] In a time when many question the relevance of galleries, museums and biennials as venues for art, we save the gated communities of the art world from irrelevance by bringing a new form of dialogue into their institutions.

2.4 Manifest.AR Venice Biennale Intervention Themes and Concerns

At the 2011 Venice Biennale we wished to reflect not on Venice's past glory, but on its current situation: wrestling with climate change, overrun by tourists and street vendors, fighting to keep its art biennial relevant in an era in which its national pavilions stand in direct contrast to the globalized, itinerant world of contemporary art, whose artists live and work in multiple systems of cultural reference. The national pavilions that dominate the Venice Biennale are a reflection of its origins at the end of the nineteenth century and the rise of the nation-state with a presumed monolithic ethnic or cultural identity. At the very latest since the end of the Cold War this concept has seemed antiquated, as Russia and Serbia disinherited their former comrades out of the USSR and Yugoslavian pavilions, and non-Western centers of international art such as China and the Middle East rise in prominence (Madra 2006).

Curator Bice Curiger's opening statement questioned this structure as well: "By adopting the title ILLUMInations the 54th International Art Exhibition of the Venice Biennale also aspires literally to shed light on the institution itself, drawing attention to dormant and unrecognized opportunities, as well as to conventions that need to be challenged ... Far removed from culturally conservative constructs of 'nation,' art offers the potential to explore new forms of 'community' and negotiate differences and affinities that might serve as models for the future" (Curiger 2011). Curiger also

[3]The author's contribution to "We AR in MoMA" was a matrix of screaming faces titled "ARt Critic Face Matrix," a self-referential artwork that critiqued its own validity as an artwork, reflecting on the role of MoMA NY to define what did or did not constituted art (Thiel 2010).

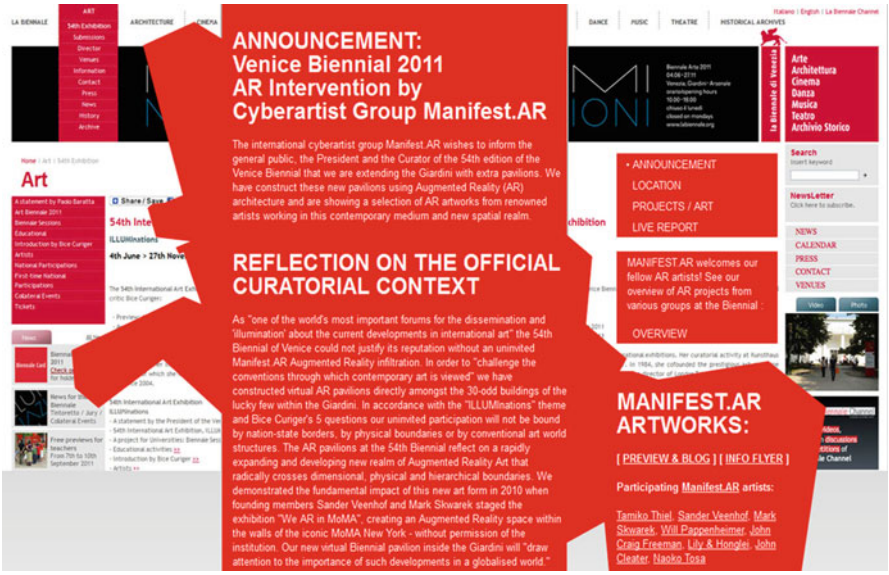

Fig. 2.1 The Manifest.AR Venice Biennial Intervention website

posed five questions on identity to each of the artists officially included in the Biennale: "Where do you feel at home? Does the future speak English or another language? Is the artistic community a nation? How many nations do you feel inside yourself? If art was a nation what would be written in its constitution?"[4]

As an international artist collective that coalesced around challenging conventions of inclusion and participation, we saw this as a personal invitation to participate. Sander hijacked Curiger's curatorial statement and the Venice Biennale website to create our Venice Manifesto, in which we proclaimed (see Fig. 2.1): As "one of the world's most important forums for the dissemination and 'illumination' about the current developments in international art" the 54th Biennial of Venice could not justify its reputation without an uninvited Manifest.AR Augmented Reality infiltration. In order to "challenge the conventions through which contemporary art is viewed" we have constructed virtual AR pavilions directly amongst the 30-odd buildings of the lucky few within the Giardini. In accordance with the "ILLUMInations" theme and Bice Curiger's 5 questions our uninvited participation will not be bound by nation-state borders, by physical boundaries or by conventional art world structures. The AR pavilions at the 54th Biennial reflect on a rapidly expanding and developing new realm of Augmented Reality Art that radically crosses dimensional, physical and hierarchical boundaries (Manifest.AR Venice Intervention 2011a).

[4] Although Curiger refers frequently to the "five questions," they are not to be found on the official Venice Biennale website. See for instance Flash Art (2011).

Fig. 2.2 In the Venice Giardini: John Craig Freeman, Sander Veenhof, Simona Lodi (Share Festival), and Will Pappenheimer and John Cleater in screens

We wanted our intervention however to go beyond merely addressing Curiger's statement, and also reflect on events in the wider world as they related specifically to the realities of Venice as a contemporary city. Questions about control of space went beyond the confines of the Giardini. So-called "public" art has always depended on permissions from the authorities to allow art to be placed in public view, and many a "public" space is actually closely controlled. We therefore placed artworks not only in the controlled curatorial space of the Venice Giardini, but also in the public space of Piazza San Marco, which has itself seen censorship of officially planned artworks (Magill 2007).

Four of us from Manifest.AR were able to actually go to Venice, and another five provided round-the-clock support from their various locations. Although AR artworks can be created and placed on site from anywhere in the world via the Internet, people are needed on site to document the artworks in screenshots and video recordings, and – important for invisible artworks – to spread information on the intervention to the audience and engage them in viewing the artworks. We collaborated closely with another group intervention, The Invisible Pavilion. Organized by Share Festival director Simona Lodi and the artist group Les Liens Invisible, represented on site in Venice by Gionatan Quintini, we produced a common flyer and held joint AR tours in the Giardini and Piazza San Marco (see Figs. 2.2 and 2.3, and also Manifest.AR Venice Intervention 2011b).

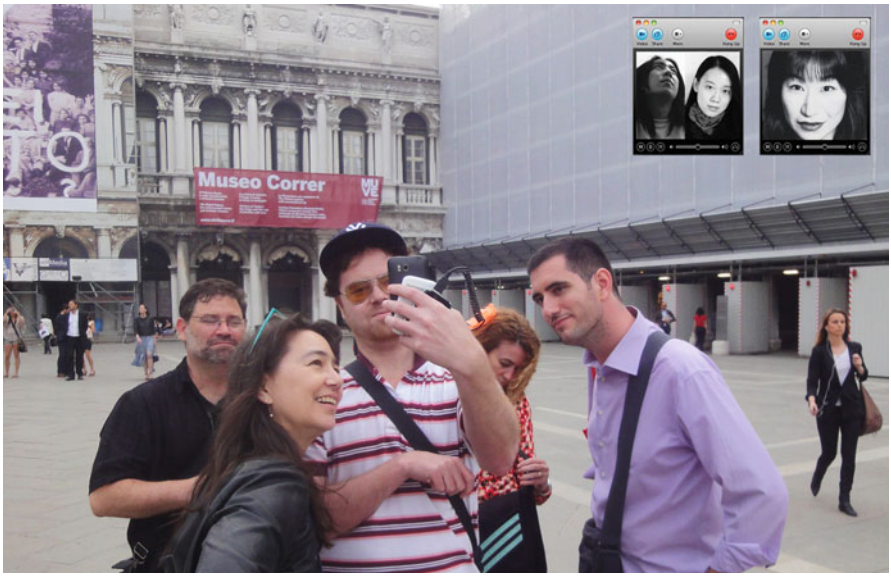

Fig. 2.3 In Piazza San Marco: John Craig Freeman, Tamiko Thiel, Mark Skwarek, Simona Lodi (Share Festival), Gionatan Quintini (Les Liens Invisible). In screens: Lily and HongLei, Naoko Tosa

2.5 Manifest.AR Artworks in the Venice Biennale Intervention

The author Tamiko Thiel's work, *Shades of Absence*, is a series of three "virtual pavilions" formed of terms of censorship and containing anonymized golden silhouettes of artists whose works have been censored. It posited a transnational community of censored artists in reply to Bice Curiger's questions: "Is the artistic community a nation? If art was a nation what would be written in its constitution?"

Shades of Absence: Outside Inside addressed the precarious status of artists threatened with arrest or physical violence (see Fig. 2.4). *Shades of Absence: Schlingensief Gilded* is a memorial to the controversial artist Christoph Schlingensief, and was placed directly in his posthumous exhibit in the German Pavilion (Fig. 2.5). *Shades of Absence: Public Voids* puts silhouettes of artists whose works in public places have been censored – including several by the Venice Biennale itself – in the Piazza San Marco (Fig. 2.6). In all works, touching the screen while viewing one of the artworks brings a link to a website with cases of these particular types of censorship (Thiel 2011b).

Sander Veenhof's work *Battling Pavilions* directly challenged the role of the curator, the exclusive nature of the Giardini and the limited number of national pavilions allowed within its Sacred Grove. Users of this augmented reality app were given different curatorial powers depending on their physical location. If they were

Fig. 2.4 *Shades of Absence: Outside Inside* by Tamiko Thiel (2011). Augmented Reality, Venice Giardini. A memorial to artists threatened with arrest or physical violence

Fig. 2.5 *Shades of Absence: Schlingensief Gilded* by Tamiko Thiel (2011). Augmented Reality, German Pavilion, Venice Giardini. A memorial to the artist Christoph Schlingensief, placed in his posthumous exhibit in the German Pavilion

Fig. 2.6 *Shades of Absence: Public Voids* by Tamiko Thiel (2011). Augmented Reality, Piazza San Marco, Venice. A memorial for artists whose works in public spaces have been censored

outside the Giardini they could create a new virtual pavilion for any nation of their choice and place it in the Giardini (Fig. 2.7). If they were inside the Giardini, they took on the role of Biennale curator Bice Curiger defending her curatorial powers, and could delete any of the upstart intruding pavilions (Figs. 2.8 and 2.9).

In a classic twist, Sander's intervention also became an official part of the Biennale: hearing of his intervention, dropstuff.nl invited him to show his Battling Pavilions on their large screens in three locations around Venice (Veenhof 2011, see Fig. 2.7).

Mark Skwarek's *Island of Hope* addressed the physical situation of the islands of Venice, which since the founding of the city have been under perpetual threat of sinking into the lagoon. Skwarek posited new forces of continental uplift bringing hope of survival to Venice, the tectonic forces erupting out of the ground as fully formed baroque gardens in the Giardini (Fig. 2.10) and in Piazza San Marco (Fig. 2.11). Besides bringing additional landmass, all-powerful goddesses on the islands incorporate objects of hope, and tweets with the hash tag #hope, into the gardens in order to bring peoples' hopes and dreams to life (Skwarek 2011).

John Craig Freeman's *Water wARs: Squatters Pavilion* also focuses on the rising water levels in Venice, but with a dramatic difference. Water wARs is a virtual squatter's camp for refugees of water wars, one camp directly inside the protecting walls of the Giardini (Fig. 2.12), and another "public" camp in Piazza San Marco (Fig. 2.13).

Fig. 2.7 *Battling Pavilions* by Sander Veenhof (2011). Augmented Reality Game. Scoreboard on dropstuff.nl screen during the Venice Biennale, displaying scoreboard of unauthorized virtual pavilions in the Giardini

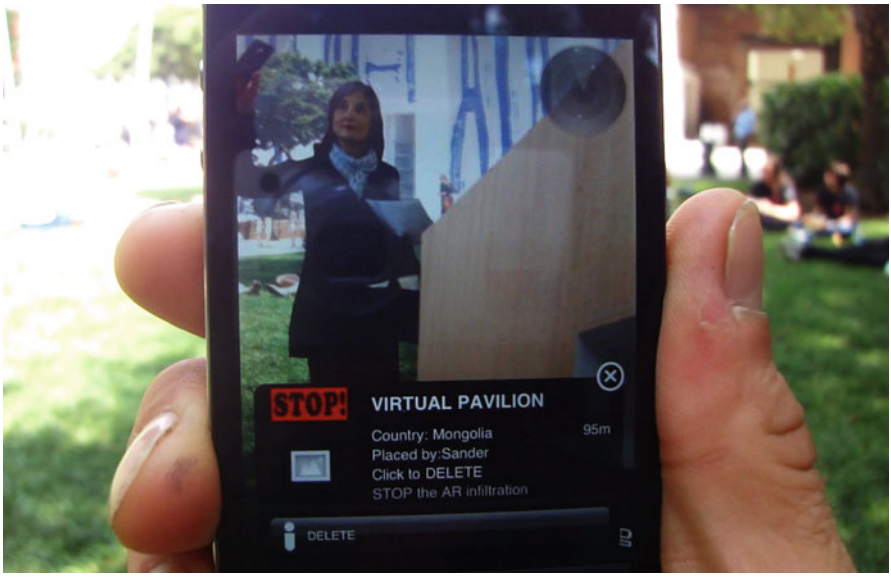

Fig. 2.8 *Battling Pavilions* by Sander Veenhof (2011). Augmented Reality Game. A visitor in the Giardini helping curator Bice Curiger to delete an unauthorized virtual pavilion

Fig. 2.9 *Battling Pavilions* by Sander Veenhof (2011). Augmented Reality Game. The virtual version of curator Bice Curiger checks the Dutch Pavilion to make sure there are no unauthorized pavilions here

Fig. 2.10 *The Island of Hope* by Mark Skwarek (2011). Augmented Reality. Seen in the Venice Giardini

Fig. 2.11 *The Island of Hope* by Mark Skwarek (2011). Augmented Reality. Seen in the Piazza San Marco

Fig. 2.12 *Water wARs, Giardini* by John Craig Freeman (2011). Location-based Augmented Reality. Pavilion for undocumented artists/squatters and water war refugees in front of the Giardini Central Pavilion

Fig. 2.13 *Water wARs, Piazza San Marco* by John Craig Freeman (2011). Augmented Reality. Pavilion for undocumented artists/squatters and water war refugees in Piazza San Marco, Venice

In Venice, a city itself founded by refugees and threatened by constant flooding, Water wARs calls attention to the escalating global struggle for this basic human need, made increasingly scarce not only by environmental damage but also through privatization of water supplies by multinational corporations. It questions the ability of sovereign nations to isolate themselves from the rest of the world, as worldwide ecological disasters drive people in desperation to violate the boundaries of the nation-states in pursuit of sheer survival (Freeman 2011).

John Cleater's work *Sky Pavilions* provides help for Venice from an unexpected direction altogether – from above. Alien Sky Pavilions descend from outer space and take over Venice: The mothership hovers over Piazza San Marco emitting a mixture of nonsense and guidance to confuse and help tourists, natives, and art seekers (Fig. 2.14). In the Giardini alien "Floaties" lie in wait, begging to be touched, and when activated by obliging visitors spin upwards, carrying secret messages to the mother ship (Fig. 2.15).

Sky Pavilions goes beyond the concept of the nation-state, beyond the concerns of mere earthbound humanoids and reminds us that the last word in the control of space may not be ours to decide (Cleater 2011).

Lily and Honglei's work *The Crystal Coffin: Virtual China Pavilion* brings us squarely back to earth and confronts us with the realities of our shifting national structures. It is inspired by China's (current) Holy of Holies: Mao Zedong's crystal coffin, a petrified symbol of eternal Party rule. Placing the crystal coffin into the Giardini, the Sacred Grove of the Venice Biennale, both questions the traditional

Fig. 2.14 *Sky Pavilions* by John Cleater (2011). Augmented Reality and audio. Alien Mothership Sky Pavilion floats over Piazza San Marco

hierarchy of privilege among national pavilions in the Biennale and thematizes the rise of China as a vital – and financially important – center of contemporary art (see Fig. 2.16).

A second pavilion placed in the Piazza San Marco occupies the heart of this emblematic European city, whose native son Marco Polo "discovered" China for the West, and dominates it with this ultimate symbolic source of Chinese Party power (Fig. 2.17). At the same time, however, the reference to Mao's embalmed presence and the Party's current mandate of "traditional styles" for the pavilion building speaks of the ruling system's authoritarian tendencies that still inhibit the development of Chinese artists and intellectuals (Lily and HongLei 2011).

Will Pappenheimer/Virta-Flaneurazine's *Colony Illuminati* appropriated both the Biennale title "ILLUMInations" and the actual visual imagery of many artworks in the Biennale. This was a secret colony of virtual bufo toads that draws sustenance

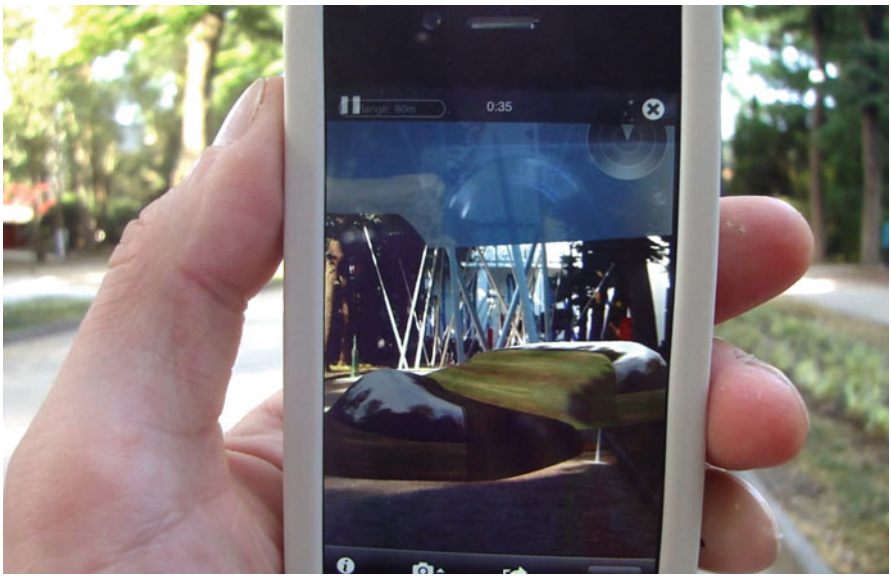

Fig. 2.15 *Sky Pavilions* by John Cleater (2011). Augmented Reality and audio. Alien Sky Pavilion "floats" in the Giardini

Fig. 2.16 *The Crystal Coffin, Giardini* by Lily and Honglei (2011). Augmented Reality. Artwork inspired by the crystal coffin in the Mausoleum of Mao Zedong in Tiananmen Square, seen here in front of the Giardini Central Pavilion

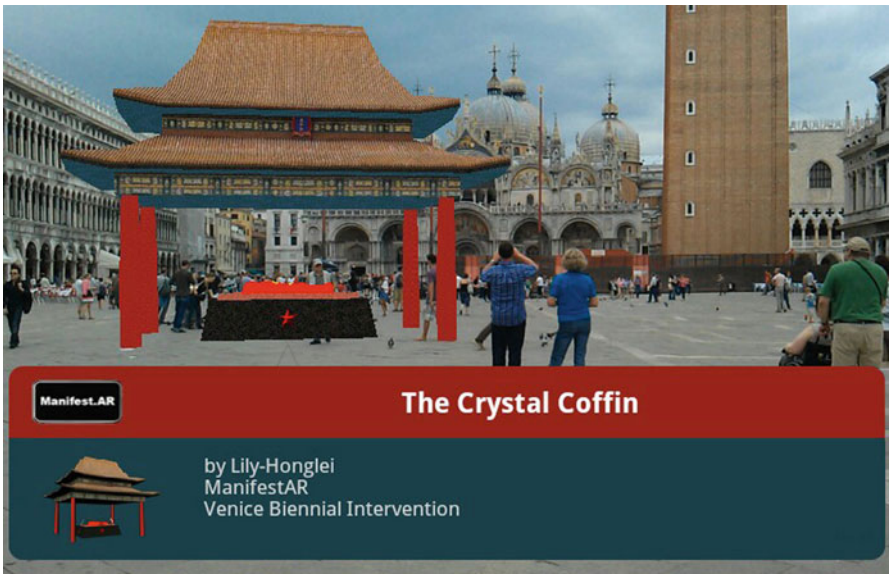

Fig. 2.17 *The Crystal Coffin, Piazza San Marco* by Lily and Honglei (2011). Augmented Reality. Artwork inspired by the crystal coffin in the Mausoleum of Mao Zedong in Tiananmen Square, seen here in Piazza San Marco

from high art: as a form of camouflage, their skin appropriates imagery from artworks around them as they multiply amongst the national pavilions in the Giardini (Fig. 2.18) and spread out into the city, seeking the outlying venues of the Venice Biennale (Fig. 2.19).

When touched on the smartphone screen, the toads release psychotropic drugs that trigger hallucinations in the viewer: a swirl of Internet information surrounding the Biennale and waves of Tintorettoesque ecstasy that Bice Curiger proclaimed to be the true essence of ILLUMInations (see Fig. 2.20 and Pappenheimer and Virta-Flaneurazine 2011).

Naoko Tosa's app *Historia* addressed Bice Curiger's question "Does the future speak English or another language?" and her view that "art offers the potential to explore new forms of 'community' and negotiate differences and affinities that might serve as models for the future" (Tosa 2011). Historia appropriates iconic images from all nations and world cultures, from times both modern and ancient, and uses them to create a mental pavilion of re-constructed meaning. The interactive artwork allows visitors to choose icons, arrange them in a sequence – and then assign each icon a new meaning (Fig. 2.21).

Historia playfully examines the process by which artists appropriate and redefine existing cultural symbols to create their own individual language, and distills it into a smartphone app. These messages, with their newly created, completely individual English "translations," appear as overlays in the Giardini and in Piazza San Marco,

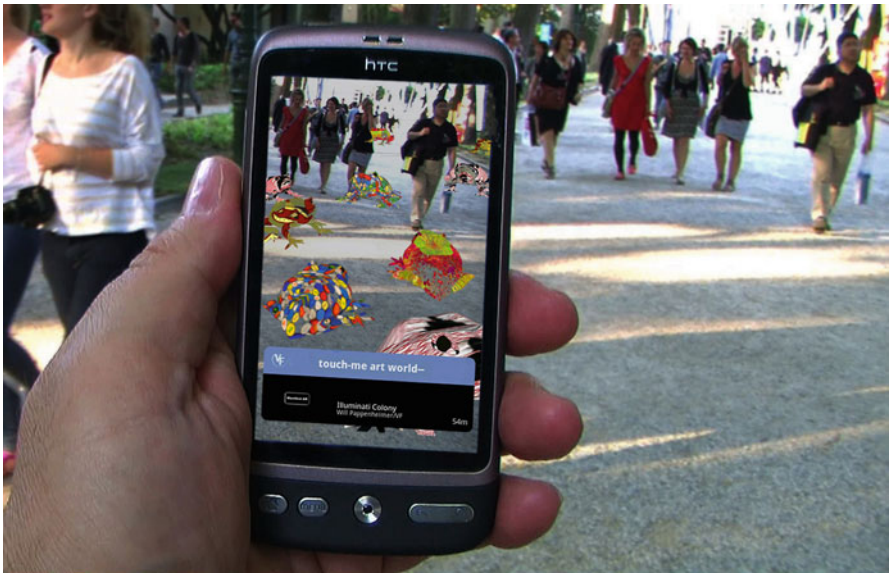

Fig. 2.18 *Colony Illuminati* by Will Pappenheimer/Virta-Flaneurazine (2011). Augmented Reality. Colony group on Giardini main concourse

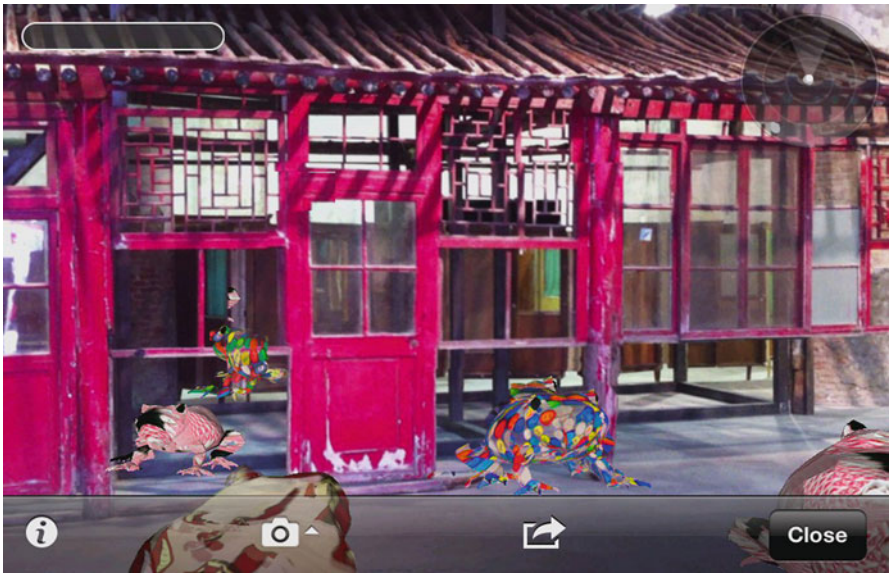

Fig. 2.19 *Colony Illuminati* by Will Pappenheimer/Virta-Flaneurazine (2011). Augmented Reality. Songdongphilic toads in the Arsenale at the Song Dong parapavilion. Video still: Sander Veenhof

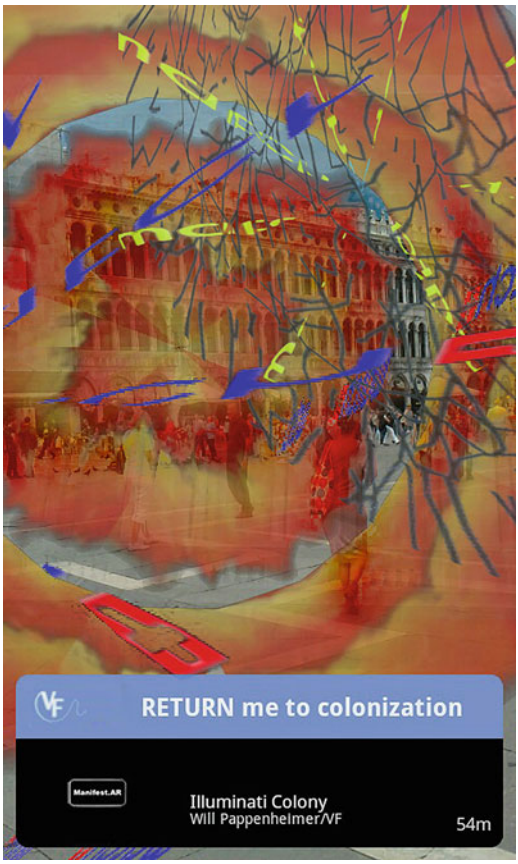

Fig. 2.20 *Colony Illuminati* by Will Pappenheimer/Virta-Flaneurazine (2011). Augmented Reality. Visionary effects of touching Colony Illuminati toads at Piazza San Marco

an international multi-cultural messaging mash-up for the transnational nation of art and art tourism (Tosa 2011, see Fig. 2.22).

The issues addressed by our works will remain relevant long after the 54th Biennale is over. Their virtual presence will remain too: as long as our servers run, the artworks of the Manifest.AR 2011 Venice Biennale Intervention will grace the city and the Giardini and can be seen by whomever looks for them (Manifest.AR Venice Biennale Intervention launch page 2011).

2.6 Venice – Lewisburg – Istanbul

Even in the planning stages our Venice Biennale intervention received the enthusiastic support of two curators deeply involved in interventionist art. Lanfranco Aceti, a practiced interventionist himself (Aceti 2008), helped us gain access to the Biennale and proposed a special issue of the Leonardo Electronic Almanac to

Fig. 2.21 *Historia* by Naoko Tosa (2011). Augmented Reality. Users compose messages by appropriating historic icons floating in the space and assigning a new meaning to their message. Seen in front of the Giardini Central Pavilion

address the questions raised by the intervention. (Aceti et al. 2013) Richard Rinehart invited us to intervene in his Samek Gallery in Lewisburg, Pennsylvania on the same day that we opened at the Venice Biennale – and titled the exhibit "Not Here" to celebrate the fact that the artworks were present even though the gallery was closed for the summer (Rinehart 2011). Later that fall Lanfranco, as director in Istanbul of both ISEA2011 and the Sabanci University Kasa Gallery, invited us to position our Venice artworks in the Kasa Gallery to create the show "Not There" (Aceti 2011; Manifest.AR blog 2011) as part of the ISEA2011 exhibition UNCONTAINABLE, an official parallel program to the Istanbul Biennale.

For the city-state of Venice, the city of Constantinople/Istanbul was a constant, looming presence both culturally and politically. In the early centuries Venice was part of the Byzantine Empire and owed allegiance – and taxes – to Constantinople, the great capital of eastern Christendom and seat of the Empire. In 1204 Venice's Doge Enrico Dandolo diverted the Fourth Crusade, bound ostensibly for the Holy Land, to Constantinople to sack the city and break its control over Venice. Weakened, Constantinople never fully recovered and finally fell to the Ottoman invaders in 1453. The lavish booty from Constantinople that adorns the Basilica San Marco in Venice turned however to poisoned fruit, as the renamed city rose to rival Venice in the Mediterranean as Istanbul, the great Muslim capital of the Ottoman Empire.

After World War I the Ottoman Empire fell apart, surviving only as the much-reduced country of Turkey, and Istanbul fell into the melancholic slumber poetically

Fig. 2.22 *Historia* by Naoko Tosa (2011). Augmented Reality. Users compose messages by appropriating historic icons floating in the space and assigning a new meaning to their message. Seen in front of Cafe Florian, Piazza San Marco

described in Orhan Pamuk's novels. In the twenty-first century, however, with Turkey's rising political and economic power Istanbul has once again become a thriving center of contemporary culture, and its former melancholy is not even a childhood memory for the current generation of young artists. Lanfranco's invitation to ISEA2011 and the Istanbul Biennale was an irresistible opportunity to experience a fascinating city through the concentrating prism of a contemporary art biennial.

2.7 "Invisible Istanbul": Istanbul Biennale 2011 AR Intervention

Through an artist residency at the Caravansarai artists' space in Istanbul (Caravansarai 2013) I had met Cem Kozar and Işıl Ünal, Istanbul architects and designers who run the design office PATTU (2013). They were interested in learning to use augmented reality technology and were deeply knowledgeable about the past and future urban development of the city, making for a fruitful collaboration on both sides. Together we created "Invisible Istanbul," a series of augmented reality works

that make visible the unseen tensions within the city and its urban fabric (PATTU and Thiel 2011). As part of the ISEA2011 exhibition UNCONTAINABLE it was also an official parallel program to the Istanbul Biennale.

The Istanbul Biennale is part and parcel of the urban development plan for the Beyoğlu district of Istanbul, and our artworks reflected on the Biennale both as a site and on its role – and the role of art exhibitions in general – in the official development plans of the city government. Some commented on the Biennale itself, others reflected on the urban space that the Biennale occupies and yet others drew a larger circle to place the Biennale area within the overall context of the Beyoğlu district.

The theme of the 2011 Istanbul Biennale also attracted my attention, as the curators Pedrosa and Hoffmann based their concept around the works of Félix González-Torres and his method of creating politically charged artworks by investing small, banal objects from daily life with very personal conceptual significance. This method, and the curators' emphasis "on works that are both formally innovative and politically outspoken" (Istanbul Biennale 2011), spoke directly to how I want to work with augmented reality and presented an excellent point of departure for my own investigations.

Our intervention "Invisible Istanbul" consists of two parts, both of which used AR to place virtual artworks within the real physical space of Istanbul and the Biennale, creating surrealistic and poetic juxtapositions between real and virtual within the context of the hidden urban dynamics of Istanbul. Both begin with Tophane, the former military barracks and munitions factory where the main Biennale buildings are now located.

My works for "Invisible Istanbul," *Captured Images*, took as a point of departure the displays of military power during the Ottoman Empire on the site where now the Istanbul Biennale celebrates its power in the contemporary art world. This work series was inspired by photographs of Tophane taken at the end of the 19th for the last Sultan, Abdul Hamid II, showing displays of military might: soldiers lined up for drills; rows of cannon captured from enemy armies; shells of different caliber ordered by size; cannonballs stacked into pyramids. (U.S. Library of Congress 2013) In the 1950s the barracks and factories were replaced with faceless warehouses and the rows of ordnance replaced with rows of goods. Today, these warehouses have been turned into exhibition spaces for art and the rows of goods have made way for rows of artworks. My artworks continue this transformation, using objects from daily lives as their munitions and appropriating the main Biennale exhibition spaces as their venues, especially the group exhibitions "Untitled (Death by Gun)" and "Untitled (Passport)" (Thiel 2011a).

My works also reflect on tensions in Turkish civil society between tradition and modern, between military, political parties, opposition groups inside and outside of the political system, propaganda from all sides, the power of the journalist's pen(cil) to reveal and protest and uncover, but also of the political bureaucracy to define laws and jail sentences that are powerful weapons of intimidation. The Gezi Park protests of 2013 have only made the works more relevant.

Fig. 2.23 *Captured (cannon balls)* by Tamiko Thiel (2011a). Augmented Reality. Virtual nazar boncuğu glass amulets with animated eyeballs. Seen in the Istanbul Biennale exhibition "Untitled (Death by Gun)," with Kris Martin's *Obussen II*

In *Captured (cannon balls)* the ever-present Turkish nazar boncuğu glass amulets were stacked in piles inside the Biennale exhibit "Untitled (Death by Gun)." These amulets shatter when they avert the evil eye – what would it mean to use them as cannonballs (Fig. 2.23)?

Several works deal with the pencil as a symbolic weapon of rhetoric and propaganda for sides, whether journalist, blogger or bureaucrat. They can be fat as cannon as in *Captured (cannon)*, as stubby as projectiles as in *Captured (shells)*, which I placed in the exhibit "Untitled (Death by Gun)," or surround the viewer completely as in *Captured (stockade)*, placed in the exhibition "Untitled (Passport)" (see Fig. 2.24).

Of course the pencil has long been replaced by the digital, so I created *Captured (for RSF_RWB)* and placed it also in the exhibit "Untitled (Passport)." The name derives from the Twitter hash tag of Reporters Sans Frontières (Reporters Without Borders), and the artwork consists of RSF_RWB tweets in which I censored the substantive words and animated them to surround the viewer in a constant flashing stream (Fig. 2.25).

Finally, as a memorial to the assassinated Armenian-Turkish journalist Hrant Dink I created *Captured (for Hrant)*. I took the last artifact we saw of him, his worn shoe soles sticking out from under the sheet covering his dead body in the middle of a main street in Istanbul. The shoe soles, in gold, wander around the viewer. This work I put against the stark geometric purity of Biennale architect Ryue Nishizawa's container walls (Fig. 2.26).

Fig. 2.24 *Captured (stockade)* by Tamiko Thiel (2011a). Augmented Reality. Virtual pencils surround the viewer. Seen here in the Istanbul Biennale exhibition "Untitled (Passport)"

Fig. 2.25 *Captured (for RSF_RWB)* by Tamiko Thiel (2011a). Augmented Reality. The viewer is surrounded by censored tweets from Reporters Sans Frontières – Reporters Without Borders. Seen here in the Istanbul Biennale exhibition "Untitled (Passport)"

Fig. 2.26 *Captured (for Hrant)* by Tamiko Thiel (2011a). Augmented Reality. The viewer is surrounded by the animated footsteps of murdered Armenian-Turkish journalist Hrant Dink. Seen here against the exhibition architecture done by Ryue Nishizawa for the Istanbul Biennale

PATTU (Cem Kozar and Işıl Ünal) created *Invisible Istanbul: Urban Dynamics* as an augmented reality walking tour that departs from the Istanbul Biennale site in the Tophane neighborhood and winds through the nearby neighborhoods of Karaköy and Galata. Using their deep knowledge of both the city's past and the official development plans for the future, PATTU has used AR as a medium to map and visualize the dynamics of change that shape both the contemporary urban space and the lives of its inhabitants. The smartphone or iPad becomes a viewing instrument to bring into focus forces invisible to the naked or unknowing eye, and make them visible in the public sphere.

For each site or "node" along the route PATTU looked at the past, present and future uses of the area. The AR artworks at each site envelope the viewer in a cloud of artifacts that reference the activities for which each area was, is and will be used. This layer of symbolic information is visible as an overlay on the live camera view of the buildings and busy streets at each site, but is also complemented by links to a website with an historic photo of each location and a textual description of the urban dynamic in play at each site (PATTU 2011). A small selection of nodes are described below as examples of the rich layers that can be experienced at each site.

Node 1: The Docks is in Tophane by the Antrepots used for the Istanbul Museum of Modern Art and the Biennale. Looking down at the ground one sees cannon and other munitions, symbolizing the area's previous use as a military barracks and munitions factory. Looking straight ahead, one sees heavy gold painting frames and

Fig. 2.27 *Invisible Istanbul: Urban Dynamics – Node1* by PATTU (Cem Kozar/Işıl Ünal) 2011. Augmented Reality. The Docks: From munitions factory to art exhibitions to shopping mall

fragments of well-known modern paintings, symbolizing the area's current use for exhibitions of modern art. Looking up, one sees logos of multinational companies – McDonalds, Converse etc. – symbolizing the development plans that call for turning the whole area into a large terminal and shopping mall for cruise ships, where visitors can shop for the usual international brands without having to deal with the city or culture of Istanbul (Fig. 2.27).

In *Node 4: The Minorities of Istanbul* the past shows a rich diversity of shop signs in what was Istanbul's most multicultural neighborhood – destroyed by the Pogrom of September 6th/7th 1955, symbolized by the cloths of the textile merchants that littered the streets for days afterwards. Currently slumbering in urban decline, the future is to be dominated by hotels and shopping malls (Fig. 2.28).

In *Node 5: Brothels* both the past and the present are dominated by symbols of brothels, the single surviving one being tucked away on the picturesque side street visible in the screenshot. A look skywards shows that this area is slated for development of a park and high-end hotels (Fig. 2.29).

Standing on Voyvoda or Bank Street to view *Node 8: Museum Inflation* one still sees trucks loading and unloading sacks of money at the same banks that dominated

Fig. 2.28 *Invisible Istanbul: Urban Dynamics – Node 4* by PATTU (Cem Kozar/Işıl Ünal) 2011. Augmented Reality. The Minorities of Istanbul. From cosmopolitan Galata through the Pogrom of Sept. 6th/7th to hotels and shopping malls

this area in the past. The smaller buildings are now dominated by electronic shops selling everything from lamps to satellite dishes, and the banks themselves are being turned into art museums. Looking up one sees symbols for art and for the hotels that are also planned for this area in the future (Fig. 2.30).

This is just a small sample of the sites covered by Invisible Istanbul: Urban Dynamics. As diverse as was the past and present in these neighborhoods, the future repeats itself in alarming monotony: multinational brands, upscale hotels – according to the official development plans for the city of Istanbul. The tour should be a requirement for everybody interested in the fate of this fascinating and dynamic city.

2.8 Conclusions

The Venice and Istanbul Biennales of 2011, and the questions raised by their curators, framed questions that we took far beyond the curators' original intent in order to also address issues of curatorial control of selection and space, inclusivity and exclusivity, and the autonomy of the artist in the light of the possibilities of the new medium of geolocative augmented reality.

Fig. 2.29 *Invisible Istanbul: Urban Dynamics – Node 5* by PATTU (Cem Kozar/Işıl Ünal) 2011. Augmented Reality. Brothels: From many brothels to one brothel to a park and hotels

Our works at the Venice and Istanbul Biennales went however beyond a reflexive focus on art world dilemmas to address contemporary issues in the cities in which the biennials took place. Venice and Istanbul are two of the world's most compelling cities, overlaid with complex and often conflicting webs of history and memory, fantasy and desire. The new technology of mobile augmented reality allowed us to dialogue with these sites in a new manner, transforming specific sites into both the context and the canvas for our works of art.

I end with a quotation from Bice Curiger's curatorial text for the Venice Biennale:

"ILLUMInations presents contemporary art characterized by gestures that explore notions of the collective, yet also speak of fragmentary identity, of temporary alliances, and objects inscribed with transience. If the communicative aspect is crucial to the ideas underlying ILLUMInations, it is demonstrated in art that often declares and seeks closeness to the vibrancy of life. This is more important now than ever before, in an age when our sense of reality is profoundly challenged by virtual and simulated worlds. This Biennale is also about believing in art and its potential" (Curiger 2011).

I could not agree more. Perhaps in ways that Bice Curiger did not anticipate.

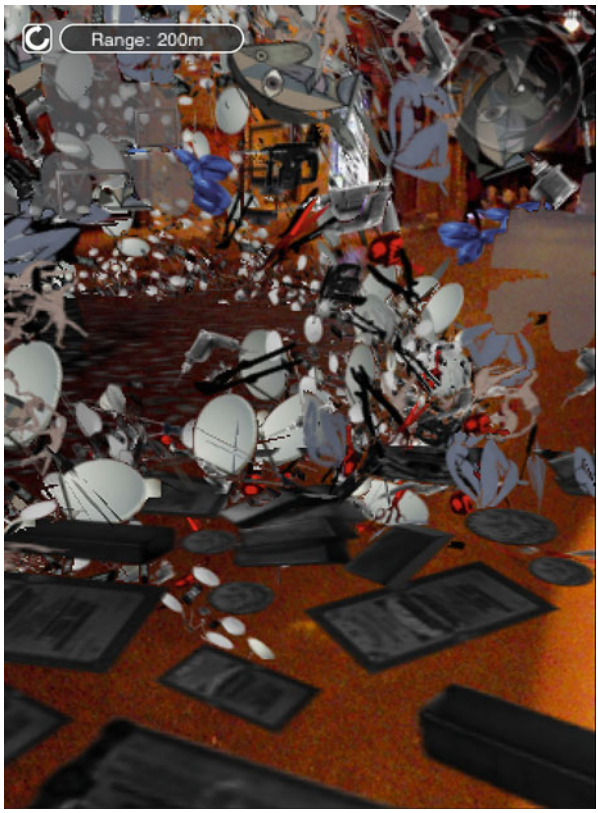

Fig. 2.30 *Invisible Istanbul: Urban Dynamics – Node 8* by PATTU (Cem Kozar/Işıl Ünal) 2011. Augmented Reality. Node 8: Museum Inflation. From banks to electronic shops to art museums and hotels

Acknowledgments I am deeply grateful to the following people, without whose help much of what is described in this article would not have happened:

Lanfranco Aceti, Editor in Chief of LEA, Director of ISEA2011 and the Kasa Gallery of Sabanci University.

Özden Sahin, Co-Editor of LEA, Conference and Program Director of ISEA2011, Vice-Director and In-house Curator of the Kasa Gallery of Sabanci University.

Rick Reinhart, Director of the Samek Gallery, Bucknell University, and external Co-Editor of the special AR issue of Leonardo Electronic Almanac "Not Here Not There."

Simona Lodi, Share Festival Director, and Gionatan Quintini, Les Liens Invisible, who curated and organized the "Invisible Pavilion" intervention at the Venice Biennale. Many thanks for the wonderful collaboration with Manifest.AR!

Julie Upmeyer and Annika Weshinskey of Caravansarai artist residency in Istanbul for their support and networking. Without them, Invisible Istanbul would not exist.

My fellow artists at Manifest.AR: Sander Veenhof, Mark Skwarek, John Craig Freeman, Will Pappenheimer, Naoko Tosa, John Cleater and Lily and Honglei, for the ongoing journey together.

My fellow artists at PATTU: Cem Kozar and Işıl Ünal, who taught me so much.

Cornelia Reinauer, the Berlin-Istanbul Express, for support and deep insights.

Elif Dazkir, who wonders when I will remember the Turkish she taught me years ago.

Viviana Torre, Fausto Sartori and Lorenzo Urbani, who opened the doors to Venice for me.

Marco Ceresa and Bruce Leimsidor, who helped me to reach another level.

References

Aceti L. The virtual places we own: when communities and artists occupy your place without your consent. Internet Research 9.0: Rethinking Community, Rethinking Place; 2008. pp. 15–8.

Aceti L. Not there. Kasa Gallery. http://kasagaleri.sabanciuniv.edu/not-there (2011). Accessed 14 Mar 2013.

Aceti L, Rinehart R, Şahin Ö et al (ed). Not Here Not There. Leonardo Electron Almanac 19(2). http://www.leoalmanac.org/vol19-no2-not-here-not-there-part-2/ (2013). Accessed 29 Nov 2013.

Caravansarai. http://www.caravansarai.info (2013). Accessed 14 Mar 2013.

Caribbean Cultural Center African Diaspora (CCCADI). Call for artists|Mi Querido Barrio Augmented Reality Project. http://cccadi.org/08/991/ (2012). Accessed 12 Mar 2013.

Cleater J. Sky pavilions. Manifest.AR Venice Biennale 2011 Intervention website. http://manifestarblog.wordpress.com/cleater-venice-2011/ (2011). Accessed 14 Mar 2013.

Conflux Festival. We AR in MoMA. http://confluxfestival.org/projects/conflux-festival-2010/we-ar-in-moma/ (2010). Accessed 12 May 2014 via the Internet Archive Wayback Machine capture from June 29 2012: https://web.archive.org/web/20120629220542/http://www.confluxfestival.org/projects/conflux-festival-2010/we-ar-in-moma

Curiger B. Introduction by Bice Curiger. ILLUMInazioni – ILLUMInations. Venice Biennale website. http://www.labiennale.org/en/art/archive/54th-exhibition/curiger/ (2011). Accessed 12 Mar 2013.

Fidel A. Art gets unmasked in the palm of your hand. New York Times. http://www.nytimes.com/2010/12/02/arts/02iht-rartsmart.html (2010). Accessed 30 Apr 2012.

Flash Art. Bice Curiger speaks about the Venice Biennale. http://www.flashartonline.com/interno.php?pagina=news_det&id=953&det=ok&title=Bice-Curiger-speaks-about-the-Venice-Biennale (2011). Accessed 12 Mar 2013.

Freeman JC. Water wARs: Squatters Pavilion. Manifest.AR Venice Biennale 2011 Intervention website. http://manifestarblog.wordpress.com/freeman-venice-2011/ (2011). Accessed 14 Mar 2013.

Gibson W. Neuromancer. New York: Ace Books; 1984.

Istanbul Biennale 2011. Untitled (12th Istanbul Biennial), 2011 http://12b.iksv.org/en/son_haberler.asp?id=35&c=3 (2011). Accessed 14 Mar 2013.

Lily and Honglei. The crystal coffin: virtual China Pavilion. Manifest.AR Venice Biennale 2011 Intervention website. http://manifestarblog.wordpress.com/lily-honglei-venice-2011/ (2011). Accessed 14 Mar 2013.

Madra Y. From imperialism to transnational capitalism: the Venice Biennial as a 'Transitional Conjuncture.' Rethinking Marxism 18(4). http://www.academia.edu/2072820/From_Imperialism_to_Transnational_Capitalism_The_Venice_Biennial_as_a_Transitional_Conjuncture_ (2006). Accessed 14 Mar 2013.

Magill RJ Jr. For Gregor Schneider's cube, a long pilgrimage. New York Times. http://www.nytimes.com/2007/04/16/arts/16iht-cube.1.5303319.html (2007). Accessed 14 Mar 2013.

Manifest.AR. AR Art Manifesto. Manifest.AR artist group official website. http://www.manifestar.info/ (2011). Accessed 12 Mar 2013.

Manifest.AR blog. "Not there," Kasa Gallery, Istanbul. http://manifestarblog.wordpress.com/not-there-kasa-gallery-istanbul/ (2011). Accessed 14 Mar 2013.

Manifest.AR blog. About Manifest.AR. http://manifestarblog.wordpress.com/about/ (2013). Accessed 12 Mar 2013.

Manifest.AR Venice Biennale Intervention launch page. (Viewable only on a mobile device – on a PC this will redirect to the main Manifest.AR Venice Biennale Intervention website.) http://manifestar.info/vb11/ (2011). Accessed 14 Mar 2013.

Manifest.AR Venice Biennale Intervention. Venice Biennial 2011 AR Intervention by Cyberartist Group Manifest.AR, Reflection on the official curatorial context. http://www.manifestar.info/venicebiennial2011/ (2011a). Accessed 12 Mar 2013.

Manifest.AR Venice Biennale Intervention. Joint Venice Biennale Intervention flyer for Manifest.AR & Invisible Pavilion http://manifestar.info/venicebiennial2011/biennale2011_jointPostcard.pdf (2011b). Accessed 29 Nov 2013.
Museum of Modern Art NY Twitter site. https://twitter.com/#!/MuseumModernArt/statuses/26786135774 (2010). Accessed 12 Mar 2013.
Oxford English Dictionary. Definition of "real." http://oxforddictionaries.com/us/definition/american_english/real (2013). Accessed 12 Mar 2013.
Pappenheimer W, Virta-Flaneurazine. Colony Illuminati. Manifest.AR Venice Biennale 2011 Intervention. http://manifestarblog.wordpress.com/pappenheimer-venice-2011/ (2011). Accessed 12 Mar 2013.
PATTU. Invisible Istanbul: Urban Dynamics. http://www.invisibleistanbul.org/ud/ (2011). Accessed 12 Mar 2013.
PATTU. Architecture, research, design. http://pattu.net/ (2013). Accessed 12 Mar 2013.
PATTU, Thiel T. Invisible Istanbul. http://www.invisibleistanbul.org/ (2011). Accessed 12 Mar 2013.
Rinehart R. Not here: an augmented reality project by MANIFEST.AR. Samek Gallery. http://galleries.blogs.bucknell.edu/2011/07/08/current-exhibitionnot-here/ (2011). Accessed 12 Mar 2013.
Rockefeller Foundation. Caribbean Cultural Center – African Diaspora Institute. http://www.rockefellerfoundation.org/grants/grants-and-grantees/275e7e1d-f90b-4f52-aee2-64128bf56f0b (2012). Accessed 12 Mar 2013.
Skwarek M. Parade to hope. Manifest.AR Venice Biennale 2011 Intervention. http://manifestarblog.wordpress.com/skwarek-venice-2011/ (2011). Accessed 12 Mar 2013.
Standage T. Live and unplugged. The Economist. http://www.economist.com/news/21566417-2013-internet-will-become-mostly-mobile-medium-who-will-be-winners-and-losers-live-and (2012). Accessed 12 Mar 2013.
Sterling B. Augmented reality: AR uninvited at MOMA NYC. Beyond the Beyond. WIRED. http://www.wired.com/beyond_the_beyond/2010/10/augmented-reality-ar-uninvited-at-moma-nyc (2010). Accessed 30 Apr 2012.
Talbot D. Kenya's Startup Boom. Technology Review. MIT, Cambridge, MA. http://www.technologyreview.com/communications/39673/ (2012). Accessed 12 Mar 2013.
Thiel T. We AR in MoMA exhibit. Tamiko Thiel website. http://www.tamikothiel.com/We-AR-in-MoMA/ (2010). Accessed 9 May 2014.
Thiel T. Invisible Istanbul: Captured Images. Tamiko Thiel website. http://www.tamikothiel.com/AR/ii/images.html (2011a). Accessed 10 May 2014.
Thiel T. Shades of absence. Manifest.AR Venice Biennale 2011 Intervention. http://manifestarblog.wordpress.com/thiel_venice-2011/ (2011b). Accessed 12 Mar 2013.
Tosa N. Historia. Manifest.AR Venice Biennale 2011 Intervention. http://manifestarblog.wordpress.com/naoko-tosa-venice-biennial-2011/ (2011). Accessed 30 Apr 2012.
U.S. Library of Congress. Abdul-Hamid II Collection of photographs of the Ottoman Empire: Search term 'Tophane' http://www.loc.gov/pictures/search/?q=tophane&sg=true; Cannon captured from foreign states http://www.loc.gov/pictures/resource/cph.3b28721/; Cannon shells in various sizes http://www.loc.gov/pictures/resource/cph.3b28724/; Drill of the students of Tophane http://www.loc.gov/pictures/resource/cph.3b47778/ (2013). Accessed 14 Mar 2013.
Veenhof S. DIY day MoMA Oct 9th 2010 AUGMENTED REALITY art invasion! Sander Veenhof website. http://www.sndrv.nl/moma/ (2010). Accessed 12 Mar 2013.
Veenhof S. Battling Pavilions. Manifest.AR Venice Biennale 2011 Intervention. http://manifestarblog.wordpress.com/sander-veenhof-venice-biennial-2011/ See also: http://www.sndrv.nl/battle/ (2011). Accessed 14 Mar 2013.

Chapter 3
Beyond the Virtual Public Square: Ubiquitous Computing and the New Politics of Well-Being

Gregory L. Ulmer and John Craig Freeman

3.1 Introduction

Whereas the public square was once the quintessential place to air grievances, display solidarity, express difference, celebrate similarity, remember, mourn, and reinforce shared values of right and wrong, it is no longer the only anchor for interactions in the public realm. Public discourse has been relocated to a novel space: a virtual space that encourages exploration of mobile location-based art in public. Moreover, public space is now truly open, as artworks can be placed anywhere in the world, without prior permission from government or private authorities – with profound implications for art in the public sphere and the discourse that surrounds it. The early 1990s witnessed the migration of the public sphere from the physical realm, the town square and its print augmentation, to the virtual realm, the Internet. In effect, the location of public discourse and the site of national identity formation have been extended into the virtual world and the global network. Electracy is to digital media what literacy is to print. It encompasses the broader cultural, institutional, pedagogical, and ideological implications inherent in the transition our society is undergoing. Electracy describes the functional metaphysics necessary to exploit the full discursive potential of electronic media such as mobile media, the Internet and augmented (mixed) reality. With the emergence of these technologies on mobile devices, the distributed placefulness of Internet public discourse entertains the possibility of a new global democracy.

Orators, Rostrums, and Propaganda Stands, shown in Fig. 3.1, is based on the work of Gustav Gustavovich Klucis, including his designs for screen-radio orators,

G.L. Ulmer (✉)
Department of English and Media Studies, University of Florida, Gainesville, FL, USA
e-mail: glue@ufl.edu; http://www.clas.ufl.edu/users/glue/; http://emeragency.electracy.org

J.C. Freeman
Department of Visual and Media Arts, Emerson College, Boston, MA, USA
e-mail: john_craig_freeman@emerson.edu; http://JohnCraigFreeman.net

V. Geroimenko (ed.), *Augmented Reality Art: From an Emerging Technology to a Novel Creative Medium*, Springer Series on Cultural Computing,
DOI 10.1007/978-3-319-06203-7_3,

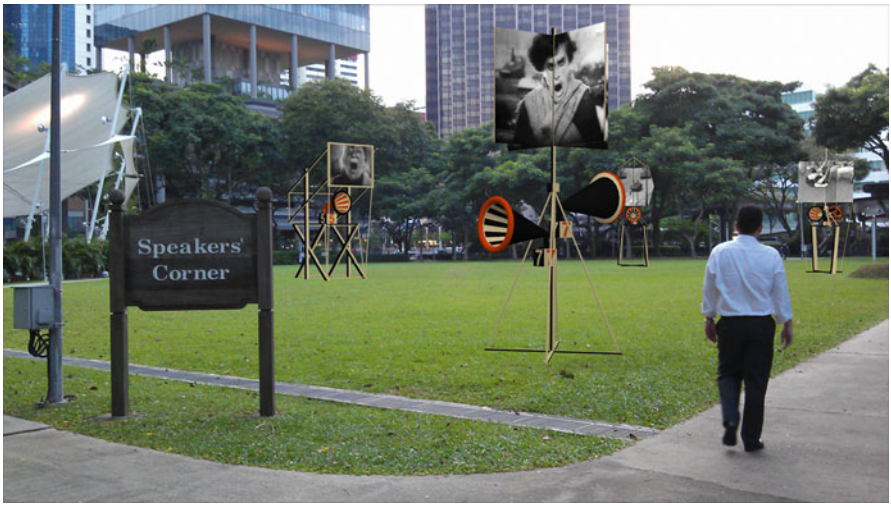

Fig. 3.1 Orators, rostrums, and propaganda stands by John Craig Freeman, Speaker's Square, Singapore, 2013, Augmented reality public art

rostrums, and propaganda stands from 1922. Klucis was a pioneering member of the Russian Constructivist avant-garde in the early twentieth century. As Russian politics degenerated under the Stalin dictatorship in the 1920s and 1930s, Klucis came under increasing pressure to devote his artwork to state propaganda. Despite his loyal service to the Communist Party, Klucis was arrested in Moscow on January 17, 1938. His whereabouts remained a mystery until 1989, when it was discovered that he had been executed by Stalin just after his arrest (Šatskih 2001). Each of the four virtual objects display a black and white animation from a contemporary mass uprising: Tank Man near Tiananmen Square in Beijing in 1989; the assassination of Neda Agha-Soltan, who was gunned down in the streets of Tehran during the 2009 Iranian election protests; scenes from Tahrir Square in Cairo during the 2011 Arab Spring; and the 2011 Occupy Wall Street uprising. Each of these images is juxtaposed, in montage, with frames from the Odessa Steps scene of Sergei Eisenstein's historic *Battleship Potemkin* film. When touched, the virtual objects play sound from the uprising. The stands call up both the resurgence and nostalgia of current worldwide political idealism as they re-imagine the public square, now augmented with the worldwide digital network.

3.2 Ubimage

The works included here are a sample of experiments testing a consulting practice (konsult) native to electracy (the digital apparatus). The consultations reference the EmerAgency, a virtual "egency", promoting a fifth estate for a global

public sphere. The genre of konsult applies Arts & Letters knowledge and methods to policy-formation controversies, with the purpose of giving social media an independent means for a collective voice with which to address governments, corporations, and entertainment entities. One premise of the experiments is that an apparatus is a social machine. Its invention includes not only technologies, but also authoring practices within new institutional support, and identity experience and behavior of individuals and groups (Ulmer 2003).

The technology of augmented (mixed) reality, ubiquitous pervasive computing (mobile locative media), when considered within the full apparatus of electracy, constitutes *ubimage*. It assumes a vision of technics on a trajectory of innovation of which the current emblem is Google Glass: the prospect of a physical and cultural environment in which there is a convergence and syncretism of total real-time information (Internet) with the present lifeworld (Lebenswelt). This convergence exists first as a juxtaposition or superimposition, with a host of emerging practices attempting a suture. Apparatus history shows that the invention of authoring practices has its own sources apart from the evolution of technics.

3.3 Apparatus

The electrate apparatus is invented in three registers: technology, compositional practices, and identity formation. The saturation of everyday environments with mobile devices encountering sensor settings is the contribution of technics. Interactive equipment establishes at the level of technics a feature of the world central to the history of the arts, which materialize and augment a human capacity to be affected by place and event. Marcel Proust's involuntary memory, triggered by the taste of a tea biscuit (Proust 2006) or the Wolf Man (Freud 1963), whose obsessions were triggered by the site of a maid scrubbing the floor, are two famous examples of embodied triggers, emblematic of this capacity. Ubimage is a logic of *catalysis*, just as literate dialectic is a logic of analysis.

A primary focalizer for the responsibilities of konsult is Paul Virilio and his warnings about the General Accident (Virilio 1997) and more conventionally the historical fact that every invention comes with a Gift Cause (extending Aristotle's four causes beyond intentionality: material, formal, efficient, final) (Falcon 2012). Gift cause is the unintended inevitable accident associated with every invention. What is the accident potential of ubicomp? It is worth remembering that Heidegger anticipated Virilio's warnings in saying that catastrophe is inherent in being. Those YouTube videos showing "funniest home video" moments of smartphoner accidents reenact one of the founding events of philosophy (Thales fell into a ditch while gazing at the stars). "The actively violent one, the creator, who moves out into the un-said, breaks into the un-thought, who compels the unhappened and makes the unseen appear, this actively violent one stands at all times in peril. In risking a

Fig. 3.2 *Border Memorial: Frontera de los Muertos* by John Craig Freeman, On the road to Ajo along Highway 86, Arizona, 2013, Augmented reality public art

prevailing over being, he must take a risk with regard to the onrush of non-being, with regard to disintegration, un-constancy, lack of structural order and disorder" (Heidegger 2000).

Heidegger's account foregrounds the "violence" of creative invention that produces both human prevailing against the overwhelming (nature) and also catastrophe (the lesson of tragedy in general). His insight is that aporia is an irreducible dimension of poros. These experiments register this complexity: a/poria, im/mobility, no/way. Ubimage for well-being is a practice of a/poria (im/mobile media).

Border Memorial: Frontera de los Muertos, shown in Fig. 3.2, is an augmented reality public art project and memorial, dedicated to the thousands of migrant workers who have died along the U.S./Mexico border in recent years trying to cross the desert southwest in search of work and a better life. This project allows people to visualize the scope of the loss of life by marking each location where human remains have been recovered. Based on a traditional form of wood-carving from Oaxaca, the virtual object consists of life sized, three dimensional geometric models of a skeleton effigy or calaca. Calacas are used in commemoration of lost loved ones during the Mexican Día de los Muertos, or Day of the Dead festivals. According to indigenous belief, despite the tragedy, death should always be celebrated (Holmer 2005). In the tradition of Día de los Muertos, the Border Memorial project is designed to honor, celebrate and remember those who have died and to vault this issue into public consciousness and American political debate. The project is intended to provide a kind of lasting iconic presence in an otherwise ephemeral physical environment and cultural discourse.

3.4 Theoria

This sample of works retrieves the institution of theoria, as practiced in the ancient world – a combination of tourism and theory. The most famous example of theoria is the visit of the three Wise Men to the manger in Bethlehem, to determine the truth of the rumors that a new king was born. A theoros (member of a theoria) is sage, someone like Solon for the Classical Greeks, a person trusted by the community, dispatched to sort out fact from fiction in the information flow of a community (Plato 2006a). Theoria toured a situation, consulted with locals who served as guides to all the shrines, sites, and important personages of the area. The theoria announced its findings *in the public square of its home city*, and these findings constituted what was the case. Aristotle's invention of metaphysics began with the *Categories*, as if codifying in grammar the declarative form that may be determined as either true or false, for making trustworthy statements in the service of the Polis. A version of his categories survive today in traditional journalism (the five W's, beginning with "What?").

Ubimage makes possible a new dimension of consulting, triangulating between the present institution of tourism (a vital contemporary vernacular behavior, largest single industry in the world), and the historical practice of divination (tarot, for example, mapping the universal journey through life for pre-modern people). Divination was an essential part of traditional deliberative reason, concerned with decision-making to influence future conditions. It was a faculty for processing the future, just as memory is a faculty for processing the past. Both tourism and divination model a certain functionality to be appropriated by ubimage. Tourism orients GPS (physical mobility), and divination orients EPS – Existential Positioning System (metaphysical mobility). The retrieval of these registers of theoria for konsult calls attention to the contradiction of contemporary media: enthusiasm for mobile computing masks the metaphysical immobility of modernity, the fundamental aporias that arrest policy decisions on behalf of well-being at every turn (trope). The global city remains as paralyzed as it was when its labyrinth was first surveyed by modernist arts and philosophy. The era of electracy begins in the industrial city.

Tarot and the I Ching are especially misunderstood, due to caricature survivals in New Age and self-help contexts. These popular, vernacular practices, nonetheless, are a resource for invention in that they provide a background tradition of popular decision-making. The fifth estate via social media is crowd-sourced self-help democracy. Greek philosophy (literate metaphysics) was not invented from scratch, but was generated in the new educational institution – the Academy – as a syncretism and refinement of cultural features of the contemporary society, including the oral culture of spoken Greek. Tarot was created in Renaissance Italy and is a popular expression of the same forces shaping the work of the Neoplatonic Academy in Florence. It acquired most of its hermetic aspects in the same environment nurturing the birth of the avant-garde arts in Paris in the nineteenth century, and the commentaries bringing it most fully into contact with

Fig. 3.3 *Flotsam & Jetsam* by John Craig Freeman, Singapore, 2013, Augmented reality public art

contemporary thought are found in psychoanalysis. Psychoanalysis, in its cultural productivity, is divination, repurposed as a new logic mapping the vicissitudes of enjoyment.

Gregory Bateson identified the keywords of the oral and literate apparatuses in his book *Mind and Nature* (Bateson 2002). Reality in the oral apparatus (extended via Religion into the present) is organized by the principles of *salvation* (spiritual transcendence). Reality in the literate apparatus (extended via Science into the present) is organized by the principles of *entropy* (material immanence). Bateson does not address electracy, but the twin realities of salvation and entropy suggest why a third option is desirable. Reality in the electrate apparatus (with the effect of reordering the other institutions) is organized around *well-being* – the problematic of happiness, recently entering public policy in the form of hedonics. At present this organization is emergent within Entertainment, commercial and commodity forms, the institutionalization of aesthetics. As Kant argued in promoting aesthetic taste to equal status with Pure and Practical Reason in his third critique, the function of judgments of beauty and the sublime was to bridge the abyss separating nature's necessity and human freedom (Kant 1951).

Flotsam is floating wreckage of a ship or its cargo. Jetsam is part of a ship, its equipment, or its cargo that is purposefully cast overboard or jettisoned to lighten the load in time of distress and that sinks or is washed ashore by the coriolis effect: planetary vorticity along with horizontal and vertical friction. Marking the contour of the expected sea level 50 years from now, *Flotsam & Jetsam*, shown in Fig. 3.3, is a clarion call for the denizens of the world to take seriously the science of climate change and other abuses to the global environment by envisioning the debris left by storm surge and other manifestations of the incoming tide.

3.5 The Malala Test

What is at stake in this syncretizing ambition for the arts in electracy may be seen in the irreducible hostility between religion and science currently plaguing civilization. We must appreciate that this confrontation is between not just institutions, but entire apparati. Any number of incidents might represent the impasse for our time, as the confrontation between Galileo and the Church did for Bertolt Brecht. A radical Islamist group in Nigeria calling itself "Boko Haram" (meaning "Western Education is Sacrilege"), burned down a school in Nigeria, killing 29 students and an English teacher. The Khmer Rouge included in its genocide anyone wearing glasses, a shibboleth signaling "intellectual." Konsult takes the side of Malala Yousafzai against her Taliban would-be assassins: "One child, one teacher, one book, one pen can change the world," she declared, in demanding the right to education for everyone. Ubimage takes up again the old struggle between pens and swords, to demand that religion and science correlate with well-being.

A caveat to avoid melodramatic oversimplifications of the test is found in another version of the opposition: Jihad vs. McWorld. Is Las Vegas the best electracy can do in promoting the good life? Each apparatus has its own version of fair and foul. What if obesity fell into the wrong hands? The challenge of ubimage is to extrapolate from the inventions of corporate entertainment (the leading edge of electrate institution formation) the means of metaphysical innovation that transforms the conflict of civilizations into a correlation of apparati. What in fact constitutes well-being? Aristotle said it was happiness, accomplished through the good, but these transcendental terms could only be defined within a Polis, a political community, since they were not given as actual, but only as potential. The fifth estate (ubiquitous democracy) is this Polis. An immediate goal of konsult is to develop a practice to support community institutionalization of well-being outside merely commercial values (Bataille's restricted economy) (Bataille 1991), but also apart from the restrictions of religion and science. The short-term goal of the present experiments is to understand and undergo for ourselves the basic insight into well-being expressed in Arts & Letters tradition, as a first step toward designing a practice for general electracy.

The convergence of Internet and lifeworld producing an ecology of information creates a need and opportunity to develop a contemporary version of the microcosm-macrocosm correspondences enjoyed by pre-modern civilizations. The systems of correspondences organizing divination that oriented individuals to the ethos and habitus of society were destroyed by modernity (scientific industrialized utilitarian society). The program for a new "correspondence" (Baudelaire's "forest of symbols" (Baudelaire 1994), Walter Benjamin's Arcades allegory (Benjamin 1999)) concerns the functionality modeled in oracles such as Tarot or the I Ching, if not the cultural content of those systems. Oracle "games" allow individuals to author epiphanies, and the epiphany form survived in modernist poetry and art in the absence of the system that supplied data from the wisdom traditions in support of practical reason (decision procedures). The experiments undertaken in

ubimage design and test a contemporary practice of correspondences, constructing a system of macro-micro-cosmos for an electrate wisdom. Ubimage is a practice of "macroimaging" (arts equivalent of macroeconomics, each dealing with the dynamics of information circulation).

3.6 Obscenario

The obscenario is a transitional alternative to the *scenarios* of conventional consulting, as a means to imagine the future in order to decide policy in a flash. Concepts are literate, and the purpose of Philosophy, according to Deleuze and Guattari, is to create concepts (Deleuze and Guattari 1994). Transition from literacy to electracy requires learning how to extend conceptual thinking within electrate media, in order to imagine our way into the new apparatus. Deleuze and Guattari analyzed "concept" into three components: an idea (term), a problem field addressed by the idea, and a conceptual persona who dramatizes the import of the idea in a situation. Obscenario shifts the emphasis from literate foregrounding of the eidos (abstract configuration of properties) to persona in a situation, which lends itself to imaging. The prototype of a conceptual persona is Socrates, dramatizing "dialectic" as idea in the dialogues of Plato. We rely on this analogy to move into the invention of a post-literate practice: an avatar of concept. The phrase is ambiguous: the concept of "avatar," and an avatar of "concept" (which itself may not appear). The first step, in other words, is to develop within literate skills a concept adequate to the invention of konsult: a practice that does for electracy what the dialogue did for literacy.

The relay from Socrates is useful to identify the features of obscenario. There are several levels for emulation: (1) Plato creates the dialogue as a device to communicate in writing the new logic of dialectic. Students are introduced to dialectic (analysis and synthesis) through an interface metaphor, the behavior of the gadfly Socrates. Dialogue as pedagogy requires a certain attitude: a commitment among friends to suspend competition in order to discover what is objectively (logically) true; (2) the scenario proper is Socrates encountering an interlocutor on the streets of Athens, in everyday life, as in *Euthyphro*, for example (Plato 2006b). Euthyphro is in a situation: he has decided to prosecute his father for impiety. Socrates asks Euthyphro to define his terms: what does he mean by "impiety." Of course to define a term produces a concept – a literate skill, but Euthyphro is illiterate; (3) The context for the apparatus is the invention of practices of logic to augment pure reason, as a capacity of selfhood (individual identity) in a democratic state (collective identity). The instruction is to extrapolate to our own case.

Concept Avatar is not dialogue or dialectic, but uses those to generate an electrate equivalent, to do for EmerAgency konsult what dialogue did for Plato's Academy. The capacity to be addressed, supported, augmented in konsult via ubimage is not reason (logic), but affect, sensory perception (aesthetics). The medium (equipment) is not alphabetic writing, but ubiquitous computing (pervasive computing: mobile devices in smart environments). Euthyphro in the midst of a situation encountered in the streets of Athens the gadfly Socrates. Egent (intern of

Fig. 3.4 *EEG AR: Things We Have Lost* by John Craig Freeman, Liverpool, 2013, Augmented reality public art

EmerAgency) consulting (testifying) on public policy encounters, via smart device in an intelligent environment, avatar. The experiments collected here are traces of avatar. Who is addressee of konsult? First, it is the egent and her network (self-addressed, middle voice). Ubimage is not a spectacle, but a distributed gadfly.

EEG AR: Things We Have Lost, shown in Fig. 3.4, allows participants to conjure up virtual objects by simply imagining them into existence using brainwave sensor technology. As part of the research, development and community engagement of this project, in 2012 we selected people at random in the streets of Liverpool and simply asked "What have you lost?" The location was recorded, a virtual lost object was created based on the response and the objects were then placed back in the exact GPS coordinates using augmented reality technology, creating a citywide network of lost things. Through this process a database of lost things was generated, including pensions, empires, dodo birds, etc. During the experimental phase of the project, test subjects were outfitted with EEG-reading brainwave sensors and ask to think deeply about what he or she has lost. Once our software detects a measurable and consistent pattern, it issues a database call to instantiate a virtual lost object at random from the database. The virtual object then appears in front of the participant, viewable on any iPhone or Android device.

3.7 Ordinary Aura

The Socratic Dialogue as a relay for concept avatar clarifies in the hypotyposis (proportional analogy) that konsult foregrounds not critical reason but perceptual affect (see also the three registers of Deleuze and Guattari: Science, Philosophy,

Arts – fact, concept, affect-percept). The challenge of ubimage is to design a practice capable of work-play with all three orders at once in the context of a situation. Such is the skill-set of electracy. The exercise testing concept avatar (the thought of feeling) takes up the imperative of the avant-garde, championed in many forms subsequently–to merge art with everyday life. The terminology calls attention to the specific target of ubimage relative to apparatus theory. The STEM engineers, as they say, have saturated the Everyday world (*Lebenswelt)* with equipment (mobile devices networking with sensors in smart environments). That takes care of technics, but the commentary tends to assume that Everyday Life is unproblematic, which is far from the case. In fact, the Everyday is a major topic of discipline interest, as for example in the philosophy of Henri Lefebvre (Lefebvre 1992), taken up in Situationism, Guy Debord (Debord 1994), not to mention Walter Benjamin's Arcades Project (Benjamin 1999), and the Frankfurt School focus on the problem of alienation as the impoverishment of everyday life experience.

Specifically, the parallel with digital convergence and saturation is the integration of the aesthetic attitude into lifeworld behavior and skills. Here is a key to the electrate apparatus in general: it emerges into metaphysics through the aesthetic attitude, just as literacy as science required the frame of curiosity in order to thrive. The invention of an "attitude" is part of apparatus formation. "Aesthetics" introduces a certain "distance" into experience, termed "aura" by Benjamin. It is important to clarify that the devotion to "pure art" (art for art's sake) during the initial period of electracy in nineteenth-century Paris (Parisian Bohemia in Montmartre cabarets is the electrate equivalent of the Athenian academies creating a space for pure reason) was inventive, a necessary concentration for articulation of art as "logic," prior to dissemination as general cultural interface (GCI) for an electrate civilization. The point is that netizens (ubizens) via the apparatus are able to include aura not as separation from but syncretic with their other institutional behaviors – work, family, leisure. Aura (aesthetic attitude) *creates value*, which recommends it as the means to overcome alienation and recover experience of individual and collective agency, which is the avatar function. The insight is that well-being refers to specific values, whose aesthetic character can and should be realized through public policy. "Being a dynamic principle, the aesthetic function is potentially unlimited; 'it can accompany every human act, and every object can manifest it.' Its limit lies in the fact that it derives from the dialectical negation of a practical or communicative function. And because the phenomena it produces in the constant renewal of the aesthetic experience are subject to societal judgment, i.e., must find public recognition before they can enter the tradition-creating process as aesthetic norms, there is a second, intersubjective limitation. In contrast to Roman Jacobson's earlier definition of the poetic influence of language, the aesthetic function is not self-referential for Mukarovsky, it is more than a statement oriented toward expression for its own sake. Because the aesthetic function changes everything that it touches into a sign, it becomes transparent for the thing or activity that it "sets aside some practical association." Precisely because the aesthetic function differs from all others (the noetic, the political, the pedagogic) in having no "concrete aim" and because it lacks "unequivocal content," it can take hold of the contents of other functions and give their expression the most effective form" (Jauss 1982).

Fig. 3.5 *Water wARs* by John Craig Freeman, Beneath the Brooklyn Bridge, New York, 2011, Augmented reality public art

Such is the attitude native to electracy. What the spiritual is to orality and the materialist to literacy, the aesthetic is to electracy.

Water wARs, shown in Fig. 3.5, anticipates the flood of environmental refugees into the developed world caused by environmental degradation, global warming and the privatization of the world's drinking water supply by multinational corporations like Bechtel. The project consists of a sprawling virtual shanty pavilion for undocumented artists/squatters and water war refugees.

3.8 Choragraphy

Konsult is a practice to correlate existential experience with everyday life materiality. For an environment to be intelligent, the apparatus needs to manage not only physical location (GPS), but EPS, which requires tracking not only presence but absence (*différance*) (Derrida 1998). If conventional wayfinding gives coordinates that say "You Are Here," existential coordinates engage a more complex orientation: *You are where you are not, and are not where you are*. A konsult is an event of encounter between egents and places, both of which involve dimensions that are not phenomenal, not present, without presence and not presentable. Such are the coordinates mapped through ubimage. Thoreau's *Walden* concludes with a figure that provides an emblem for EPS: "What was the meaning of that South-Sea Exploring Expedition, with all its parade and expense, but an indirect recognition of the fact that there are continents and seas in the moral world to which every man is an isthmus or an inlet, yet unexplored by him, but that it is easier to sail many 1,000

miles through cold and storm and cannibals, in a government ship, with 500 men and boys to assist one, than it is to explore the private sea, the Atlantic and Pacific Ocean of one's being alone" (Thoreau 1992).

Choragraphy as ontological mapping takes up this question of coordinating material and spiritual wayfinding, exploring the shifting borders and thresholds between inner and outer well-being.

Thoreau's passage is emblematic because it uses global exploration and mapping as a metaphor for self-knowledge. The challenge of EPS choragraphy is that the space-time for which it is responsible is a second-order construction, figurative rather than literal, emerging through aesthetic formal manipulation of media. But the promise of ubimage is to create an interface convergence of literal and figurative dimensions of human experience.

Clive James gives an idea of the nature of figuration that renders intelligible the nonphenomenal dimension absent from all maps. "Any poem that does not just slide past us like all those thousands of others usually has an ignition point for our attention. To take the most startling possible example, think of "Spring," by Gerard Manley Hopkins. Everyone knows the first line because everyone knows the poem. "Nothing is so beautiful as Spring" is a line that hundreds of poets could have written, and was probably designed to sound that way. Only two lines further on, however, we get "Thrush's eggs look little low heavens" and we are electrified. Eventually we see that the complete poem is fitting in its every part, for its task of living up to the standards of thought and perception set by that single flash of illumination. But we wouldn't even be checking up if we had not been put on the alert by a lightning strike of an idea that goes beyond thought and perception and into the area of metaphorical transformation that a poem demands. A poem ... is dependent on this ability to project you into a reality so drastically rearranged that it makes your hair fizz even when it looks exactly like itself" (James 2008).

Poetry is a guide for how to introduce an ignition point into public space. Two aspects of James's description are worth noting in our context: the figure of electrification and the lightning strike of an image, resonant with electracy and flash reason; that the version of reality made receivable through aesthetic indirection is – like Plato's metaphysical dimension of chora, the interface between Being and Becoming – beyond both thought and perception.

Tiananmen SquARed, shown in Fig. 3.6, is a two part augmented reality public art project and memorial, dedicated human rights and democracy worldwide. The project includes virtual replicas of the Goddess of Democracy and Tank Man from the 1989 student uprising in Tiananmen Square. Both augmentations have been placed in Beijing at the precise GPS coordinates where the original incidents took place. The Goddess of Democracy was a 33-foot tall statue, constructed in only 4 days out of foam and papier-mâché over a metal armature. Students from an art institute created the statue, placing it to face toward a huge picture of the late Communist Party chairman Mao Zedong. Tanks later flattened the statue when China's military crushed the protest. Tank Man was an anonymous man who stood in front of a column of Chinese Type 59 tanks the morning after the Chinese military

Fig. 3.6 *Tiananmen SquARed* by 4 Gentlemen, Tiananmen Square, Beijing, 2010, Augmented reality public art

forcibly removed protestors from in and around Beijing's Tiananmen Square on June 5, 1989. The man achieved widespread international recognition due to the videotape and photographs taken of the incident.

3.9 Aesthetic Attitude

Konsult includes aesthetic attitude in the public sphere, to exercise and enhance capacity to be affected. The attitude is modeled in several areas of common experience: tourism, movies, arts and crafts. Konsult applies the vanguard project of merging art with everyday life, not to make art, but to put the stamp of being on becoming. Moment against dromosphere in any case attempts praxis as poiesis. It is possible through ubimage to syncretize in one performance the three intellectual virtues – an *act recorded as image of political import that produces understanding for an egent*: Achilles, Pericles, and Homer in one. Despite his existentialist credentials, Sartre was wrong (Sartre 2013): it is possible to live and tell (at least in electracy). Such acts constitute the distributed egency of a fifth estate in a global public sphere.

Orhan Pamuk, in his novel *Snow*, tells the story of Ka, an exiled poet who returns to Turkey to report on a wave of suicides, and also to reconnect with a woman he had loved in his youth. He has not written any poetry in a number of years. But during the events of his visit, the old creative capacity returns, at least briefly, and he is able to write a poem. The example is relevant to us not for the poem, but for how the feelings of significance arise in the midst of a situation, pursuing both

professional and personal projects, while reflecting on the meaning and purpose of his life. The immediate instructions may be derived from the gradual dawning of inspiration as the circumstances of recent incidents begin to form into a system of correspondences producing epiphany.

"He made his way along the train track, past the snow-covered silo that loomed overhead like a great white cloud, and was soon back inside the station. As he passed through the empty, dirty building, he saw a dog approaching, wagging its curly tail in a friendly way. It was a black dog with a round white patch on its forehead. As he looked across the filthy waiting hall, Ka saw three teenage boys, who were beckoning the dog with sesame rolls.

There was a long silence. A feeling of peace rose up inside Ka. They were so far from the center of the world, one couldn't even imagine going there, and as he fell under the spell of the snowflakes that seemed to hang in the sky outside, he began to wonder if he had entered a world without gravity. When everyone had ceased to pay any attention to him, another poem came to Ka.

The poem was made up of many of the thoughts that had come to him all at once a short while earlier: the falling snow, cemeteries, the black dog running happily around the station building, an assortment of childhood memories, and the image that had lured him back to the hotel: Ipek. How happy it made him just to imagine her face–and also how terrified! He called the poem "Snow."

Much later when he thought about how he'd written this poem, he had a vision of a snowflake; this snowflake, he decided, was his life writ small; the poem that had unlocked the meaning of his life, he now saw sitting at its center. But – just as the poem itself defies easy explanation – it is difficult to say how much he decided at that moment and how much of his life was determined by the hidden symmetries this book is seeking to unveil. Before finishing the poem, Ka went silently to the window and watched the scene outside: the large snowflakes floating so elegantly through the air. He had the feeling that simply by watching the snow fall he would be able to bring the poem to its predetermined end" (Pamuk 2005).

The relay for ubimage is that becoming-poem occurs in the midst of life experience, and that it makes itself known through augmented perception, memory, imagination, feeling–an emotional intensification associated with revelation. This dimension of ordinary moments in everyday life is the one opened to ontological construction of well-being in electracy. Ubimage is a practice for accomplishing these events, distributed through konsult, to gather an army for well-being through an intensity of shared feeling.

With nine locations along the Peace Line in West Belfast, *Peace Doors*, shown in Fig. 3.7, addresses the ongoing conflict between the Catholic and Protestant communities there. The Peace Line is constructed of walls, fences, industrial complexes and even a shopping mall, designed to separate the Protestant Shankill neighborhood to the north from the Catholic Falls Road neighborhood to the south. The first Peace Line barriers were built in 1969, following the outbreak of the Northern Ireland riots and "The Troubles". They were built as temporary structures because they were indeed meant to be temporary, lasting only 6 months, but due to their effective nature they have become more permanent, wider and longer across the city.

Fig. 3.7 *Peace Doors* by John Craig Freeman, Along the Peace Line, West Belfast, 2010, Augmented reality public art

3.10 Rationale

Here is an outline of the logic motivating this collection of experiments.

I. Dromosphere

- Frame: Konsult proposes a practice of citizen participation adequate to the conditions of the dromosphere (dimension collapse) theorized by Paul Virilio. Virilio argues convincingly that the light-speed of the digital apparatus has made possible (inevitable) a General Accident that occurs everywhere simultaneously.
- Dimension pollution compresses time-space into Now, challenging literate formations of individual critical thinking and the democratic public sphere. This challenge is the crisis alluded to in the name of the consultancy – EmerAgency, whose motto is: "Problems B Us." Dromos (race) consists of three positions (moments, opportunities, openings): start, turn, finish. Konsult practices *Turn* (trope).

II. Prudence

- Konsult draws upon the experience of Arts and Letters traditions with immediate intuitive judgment to formulate *flash reason* as the logic needed for deliberation (community decision-making) in the dromosphere.
- Prudence (Aristotle's *phronesis*) is the virtue of good judgment. A person with good judgment is able (*posse*) – in the midst of an ongoing situation – to draw upon past experience to make the right decision about how to act

that brings about the best outcome for the community. In oral culture this kind of judgment on the fly was associated with *metis*, a skill of *savoir-faire* demonstrated in its purest style in the conduct of a race.

- *Kairos* is the mode of temporality proper to metis (the term refers to the weaver's art of throwing the shuttle at just the right moment). Kairotic time displaces cyclical (oral) and linear (literate) models of time to become the primary temporality in electracy.

III. Flash Reason

- The lightning flash of insight (intuition, inspiration) has been fully theorized in Western thought, especially with respect to Moment (*Augenblick*). Moment is taken up in konsult as the answer to Now crisis. Sudden thought draws together all human faculties to take in a situation in one (augmented) glance. The limits of this glance relative to the human sensorium are codified as "beauty," however that experience may be understood in a given culture. The invention of Aesthetics as a separate faculty at the beginnings of electracy (Kant et al.) recognized and anticipated the challenge to Moment in the notion of the sublime. The conditions of the industrial city are sublime, producing shock experience of alienation, reification, objectification, in which denizens lose connection with agency (with the categories of experience: space, time, cause).
- The arts take up the dynamics of Moment, focusing on a poetics of epiphany. Epiphany (secularized revelation) is the formal structure of flash reason, transformed in Romanticism (German Idealism) as the "crisis poem" (Harold Bloom), reconfiguring the operations of allegory and symbol, promoting tropology as supplement of inference and narrative as primary skills of the cultural interface. The project evolved across the arts, leading to a new structural mode of correspondences addressing the disjunction of microcosm/macrocosm in the city.
- Relevant versions of epiphany include Baudelaire's correspondences, Rimbaud's illuminations, Rilke's world-inner-space, Eliot's objective correlative. Proust (involuntary memory) and Joyce (epiphany) extended the function to the novel, as did Brecht (gestus, V [A] effect) and Artaud (cruelty) in theater. Freud's transference, Benjamin's dialectical image, and Merleau-Ponty's flesh are key instances of theoretical elaboration of flash reason.

IV. Mechanical Reproduction

- Manifesting a certain (happy) correlation across the levels of the apparatus, the invention of photography makes available one of the new supports of communication displacing alphabetic writing in the electrate economy. Photography was just the first in a series of major innovations lending technological augmentation to the sensorium, continuing today in digital

computing (Web 3.0). Smartphones equip the sensorium for sublime conditions. The filmic shot is kairotic. The insight of apparatus theory is that a general electracy must be developed as institution and practice to coordinate digital equipment with flash reason.

- The aesthetics of Moment was formulated in photography by Henri Cartier-Bresson's "decisive moment" (shooting *a la sauvette*). This design principle has a long history in the visual arts, with painters choosing the telling instance of an action to lend a narrative dimension to a picture. The principle reaches its theoretical completion in Gestalt psychology and phenomenology – the principle of *Prägnanz*: the combination of expectation and perception to produce default continuities or groupings in experience. Gestalt manifests the limitations of glance, inadequate to dromospheric sublime that becomes formless (information sprawl).
- Avant-garde poetics invented during this same period (nineteenth-century Paris), whose prototype is Duchamp's readymades, such as "Fountain," extended Kant's Judgment to include the automatism of the snapshot. Chance as a formal device, coordinated with recording equipment and flash poetics, were integrated in support of a new attitude towards everyday life, beyond both knowledge and will (the constitutive stands of Pure and Practical Reason).
- Theoretical complements of vanguard poetics include Georges Bataille's *informe* (formless), Deleuze and Guattari's rhizome (swarm), Lacan's stain, and related engagements with sprawl complexity.

After the 2007 shootings at Virginia Tech, you may remember the commentary that was published in the New Yorker, about the heartbreaking experience of the police carrying the bodies out of the classrooms while the cellphones in the victim's pockets and backpacks kept ringing. *School Shootings eMorial*, shown in Fig. 3.8, consists of an of augmented reality scene including a virtual replica of the Sandy Hook School sign, 20 backpacks representing each of the students and six apples representing each of the teachers and staff who lost their life in the Sandy Hook Elementary School shooting in Connecticut on December 14, 2012. When people approach the backpacks cell phone ringing sounds are triggered.

3.11 Quasi-Object

Ubiquitous imaging–ubimage signifies within a digitally supported logic in the apparatus of electracy. There is a backpack (for example), an object ubiquitous as a commodity, a quasi-object (extimate entity, simulacrum) circulating for its use and exchange value, becoming signifier. Follow the trace (inference path): Cell phones were heard ringing in the backpacks of students murdered at Virginia Tech (04/16/2007). The backpacks of the children slaughtered at Sandy Hook Elementary

Fig. 3.8 *School Shootings eMorial* by John Craig Freeman with Gregory L. Ulmer, National Mall just west of the U.S. Capital Building, Washington DC, 2013, Augmented reality public art

School in Newtown, CT (12/14/2012) were designed for the imaginations of 6-year-olds, perhaps already beyond the whimsy of Dora the Explorer and her backpack friend. Backpacks were the disguise of choice by the Chechen brothers for the IEDs targeting the Boston Marathon finish line, detonated by a connection between a cell phone and a toy car (04/15/2013). Chechen separatists took hostage 1,100 people (777 children) at a school in Beslan, Russian Federation (09/01/2004). Of the 334 killed in the 3-day siege, 186 were children. There is a certain inference trace passing through these events, bringing into appearance an opposition, a fundamental violence, archetypal, an irreducible polarity throwing apart two apparatuses – Oral and Alphabetic, Religion and Science. The emblem is made explicit in the name of a group responsible for burning down a school in Nigeria, murdering 29 students and a teacher (07/06/2013): *Boko Haram*, *The classroom as Frontier*. Recall the Khmer Rouge, the genocide of the killing fields of Cambodia (1975–1978, 1.7 million dead), in which anyone suspected of being educated was murdered. Is there a pattern gathering this path into a pathology? Is the Reign of Terror native to modernity (France 09/05/1793–07/28/1794): the guillotine (16,594 executions)? An eMorial translates one-at-a-time disasters into a public sacrifice on behalf of a national value. In the United States from 1960 to 2013, 1.3 million Americans have died from gun violence. These dead are commemorated today, martyrs to the Second Amendment to the Constitution, honored as members of a Minute Man Militia (three Americans killed each and every hour, each and every day). A society is measured by what it values.

References

Bataille G. The accursed share: consumption. Trans. Hurley R. New York: Zone Books; 1991.
Bateson G. Mind and nature: a necessary unity. New York: Hampton Press; 2002.
Baudelaire C. Correspondences. In: Henri D, editor. Symbolist art theories: a critical anthology. Los Angeles/Berkeley: University of California Press; 1994.
Benjamin W. The arcades project. Trans. Eiland H and McLaughlin K. Cambridge: Harvard University; 1999.
Debord G. The society of the spectacle. Trans. Nicholson-Smith D. Cambridge: MIT Press; 1994.
Deleuze G, Guattari F. What is philosophy? London: Verso; 1994.
Derrida J. Of grammatology. Baltimore: Johns Hopkins University Press; 1998.
Falcon A. Aristotle on causality. In: Stanford encyclopedia of philosophy. http://plato.stanford.edu/archives/win2012/entries/aristotle-causality/ (2012). Accessed 15 July 2013.
Freud S. Three case histories: the "wolf man", the "rat man", and the psychotic doctor Schreber. New York: Macmillan; 1963.
Heidegger M. Introduction to metaphysics. Trans. Fried G. New Haven: Yale University Press; 2000.
Holmer R. The Aztec book of destiny. North Charleston: BookSurge; 2005.
James C. Little low heavens. Poetry Magazine, September, 2008
Jauss H. Toward an aesthetic of reception. Trans. Bahti T. Minneapolis: University of Minnesota Press; 1982.
Kant I. Critique of judgment. Trans. Bernard JH. New York: Hafner Publishing; 1951.
Lefebvre H. The production of space. Trans. Nicholson-Smith D. Oxford: Wiley-Blackwell; 1992.
Pamuk O. Snow. Trans. Freely M. New York: Vintage; 2005.
Plato. Timaeus. Trans. Jowett B. In: The internet classics archive. http://classics.mit.edu/Plato/timaeus.html (2006a). Accessed 15 July 2013.
Plato. Euthyphro. Trans. Jowett B. In: The internet classics archive. http://classics.mit.edu/Plato/euthyfro.html (2006b). Accessed 17 July 2013.
Proust M. Remembrance of things past, vol. 2. London: Wordsworth Editions; 2006.
Sartre J-P. Nausea. Trans. Alexander L. New York: New Directions; 2013.
Šatskih AS. Vitebsk: the life of art. Trans. Tsan AS. Ann Arbor: Edward Brothers; 2001.
Thoreau HD. Walden. Boston: Shambbala Publications Inc; 1992.
Ulmer G. Internet invention: from literacy to electracy. New York: Longman; 2003.
Virilio P. Open sky. Trans. Rose J. London/New York: New Left Books; 1997.

Chapter 4
Augmented Interventions: Re-defining Urban Interventions with AR and Open Data

Conor McGarrigle

4.1 Augmented Reality

In many ways the term 'Augmented Reality' (AR) is problematic in itself but as with much in the field of 'New Media' it appears that for the moment it has gained wide acceptance in the absence of a suitable replacement. The term was originally coined by Tom Caudell and David Mizell in 1992 for applications in aircraft manufacturing at Boeing. It was associated in the 1990s with virtual reality type headsets such as prototypes like the *Touring Machine* (Feiner et al. 1997) and *Map-in-the-Hat* (Thomas et al. 1998) which were accompanied by weighty backpacks carrying the necessary computing, GPS and communication equipment, which now fits in a cellphone. Even today the HUD (Heads Up Display) paradigm still has traction as demonstrated by the interest in Google Glass,[1] however despite Google's intervention, the HUD as a model of AR can be still said to exist in the nostalgia of "yesterday's tomorrows" (Bell and Dourish 2007).

This association of AR situated somewhere along the real-virtual continuum, not quite real but not fully virtual either, serves to situate the practice in a scenario which I suggest looks toward the utopian values and ambitions of virtual reality and as such runs the risk of not attending to the real value of AR, which is its ability to contextually situate data. It is necessary to further distinguish the version of AR currently available for mobile devices from the richer conceptualisation of augmented space as articulated by Lev Manovich (2006) which encompasses the

[1] See google.com/glass

C. McGarrigle (✉)
Emergent Digital Practices, University of Denver, Denver, CO, USA
e-mail: conor.mcgarrigle@du.edu; conormcgarrigle@gmail.com; http://www.du.edu/ahss/edp; http://www.conormcgarrigle.com

V. Geroimenko (ed.), *Augmented Reality Art: From an Emerging Technology to a Novel Creative Medium*, Springer Series on Cultural Computing,
DOI 10.1007/978-3-319-06203-7_4,

gamut of distributed information resources and is not solely confined to adding context specific information overlays to a specific location in a 'camera-view' interface.

AR in its current popular implementation, working on mobile devices through platforms such as Layar, Junaio and Wikitude[2] and through SDKs for Android and IOS mobile devices such as that offered by String,[3] is a more prosaic affair. Designed as a device led experience it offers a limited set of procedures involving the over-layering of dynamic, context specific data over live 'camera-view' of physical space. Typically this information is served from geo-tagged databases, both static and realtime, supplying information such as proximity of train stations, cinemas, nearby tweets and so forth. More recent developments include a move toward augmenting print content with the display of 3D models and the ability to trigger actions, such as playing an advertising video, leading a push to monetise the technology through AR advertiser tie-ins.

It is important however to look beyond the limited nature of many of the applications currently available for the range of AR browsers to attend to the affordances of these platforms. I draw attention in particular to the ability to import and situate geo-tagged databases which can attach contextual information to any site. This offers an unprecedented opportunity for the artistic and political activation of sites with large scale data-led critiques, particularly in conjunction with physical intervention. Despite the constrained nature of the engagement possible with available AR browsers they point to a growing convergence of a burgeoning world of open and accessible data, much of it geo-tagged or available for geo-tagging, with the ability to generate overlays which attach to specific sites in real space. As an emergent technology, the application of AR is still uncertain and open to re-imagining and negotiation. Locative Media pioneer Ben Russell identified a similar openness in earlier locative technologies which he saw as seeking "grassroots and consumer level interpretation of what these devices are" (2003), in these emergent AR systems there is this sense of a technology seeking usages which are meaningful to the broadest constituency, seeking to expand rather than constrain these technologies as they begin to enter mainstream usage. This presents an opportunity to artists and activists to shape these technologies, establishing them as tools for location based annotation and critique and expanding the range of applications and understandings for these technologies as they progress from new to mature technologies.

This opportunity coalesces around two factors. The first is Open Data; the European Commission (2011) estimates that open data could result in an additional €40 billion in economic activity per annum in the EU while McKinsey management consultants estimate this increase to be worth $3 trillion globally (2013). In addition to the growth in economic activity from its enabling of innovation, the smart economy and increased Government efficiency it is also seen as integral to the

[2] See layar.com, junaio.com and wikitude.com

[3] See poweredbystring.com/product

promotion of democratic transparency. Whatever the merits of the Open Data discourse it has incentivised Governments and city officials resulted in the release of vast swaths of open, machine readable data on all aspects of Government and city operations representing a significant opportunity. AR platforms represent the second factor, they offer an ease of use, are available as apps for a range of location aware smart phones, and while flawed, overly defined, and with limited opportunities for customisation they represent the first step in AR, and with time they will improve.

4.2 Data Driven Art

In considering AR art and its relationship with data it is important to locate the discussion within an artistic tradition of using data (open or otherwise) as a tool of political critique. I see the potential for the convergence of data space and real space which AR offers as existing within this tradition and will trace this through three artists who have exerted direct influence on the *NAMAland* project. These are Hans Haacke with his seminal *Shapolsky et al. Manhattan Real Estate Holdings, A Real Time Social System, as of May 1, 1971*, Mark Lombardi's data based drawings and Josh On's *They Rule*.

The case of *Shapolsky et al.* is of particular interest as it was a data rich installation detailing ownership of 142 tenement properties and sites in New York City in the ownership or effective control of the Shapolsky Family. The work was based on data derived from publicly available records, assembled and refined, in the case of obfuscated records designed to conceal effective ownership, by the artist. The work reveals the city as a real estate system, uncovering its complex structure and demonstrating the ways in which the physical fabric of the city, and the arcane financial dealings designed to maximise the value of real estate holdings, are imbricated. It expands the idea of site beyond physical location to include its associated data space. This serves to activate these sites through providing a socio-political narrative, transforming individual buildings through augmenting them with data and thus situating them within a complex network of property and financial transactions, with far reaching repercussions for the space of the city and the everyday lives of the people living in these slums (Deutsche 1996: 169–181). The piece was to be exhibited in the Guggenheim Museum but the exhibition was controversially cancelled before its opening in April 1971 with the specificity of the work cited as the principle reason. The Museum Director held that social issues should be addressed "artistically only through symbolism, generalization and metaphor" (Deutsche 1996: 179). What caused the work to be suppressed was the specificity of the critique, which data supplied, whereas a generalised artistic critique would have been acceptable. This demonstrates the power of the data-based critique which through its attention to detail builds a framework, which goes beyond what can be thought of as a purely artistic stance though it is bolstered by this, upon which alternative narratives can be based.

The artist Mark Lombardi is known for his large scale data based drawings or "narrative structures" which detail the networks of power and money involved in various political financial scandals such as the collapse of the Bank of Credit and Commerce International detailed in *BCCI-ICIC-FAB, c. 1972–1991, (4th Version), 1996–2000*. For each drawing Mark Lombardi built a custom database culled from published information sources assembled onto cross referenced index cards, according to his gallerist Deven Golden, he had around 14,000 of them (2003), which were then condensed to create his drawings. Lombardi considered these as a method of "reprocessing and rearranging" freely available information as a way of mapping the political and social terrain (Wegener 2011). The painter Greg Stone recounts the reaction of a friend, a reporter at the Wall St Journal, on seeing Lombardi's G*eorge W. Bush, Harken Energy and Jackson Stephens* drawing, who although he was familiar with the characters in the narrative, said he "hadn't fully understood the implications until he saw it all laid out that way" (Richard 2002).

Josh On's web based work *They Rule* (Fig. 4.1) pursues a similar mission of making connections between networks of powerful individuals, this time connected though corporate directorships once again drawing from publicly available databases. *They Rule* provides a front-end interface to its underlying databases which allows users to make their own connections and share them with other users. As a work of art it presents a framework to interface with the data, inviting its audience to provide the narrative structure and co-construct the meaning. Originally powered from a custom database of directorships of the top 100 companies in the US, it now employs the database of *Littlesis*, "a free database of who-knows-who at the heights of business and government".[4]

These projects illustrate that the power of data art lies in its ability to represent information in ways which make the connections evident, presenting the information as narrative and revealing the underlying structures and patterns. How then can ubiquitous networked location-awareness of mobile devices and emergent AR techniques add to this tradition, and in an era where data and its use has assumed a greater importance than ever before, what has art practice to contribute to this field? This raises issues of site specificity and the reality of site being described not only as specific location, which the situated artwork addresses, but also as the invisible layers of data which extend our knowledge of the complex and multi-layered interactions between site, information and audience.

At this point I introduce a case study of a project by this author which follows in the tradition of data art. It is a work which doesn't claim any technical innovation, created for an existing platform and built using free and open source software, but it offers a powerful example of the ways in which data can politically (and artistically) activate sites and, I suggest, a model for connecting data and space to create an activist hybrid-space (Harrison and Dourish 1996; Kluitenberg 2006).

[4]See littlesis.org

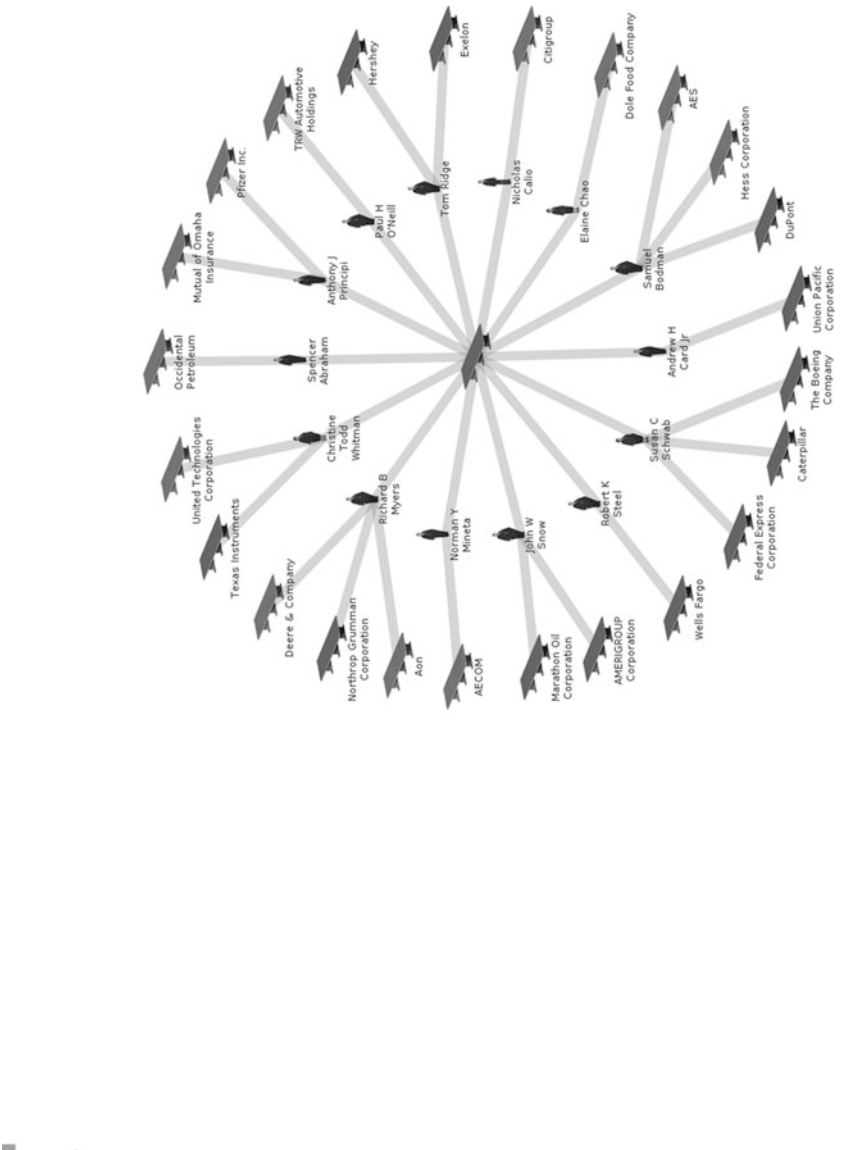

Fig. 4.1 Screen capture from Josh On's *They Rule* (2004)

4.3 NAMAland

NAMAland is a mobile AR artwork, built on the *Layar* platform (Fig. 4.2), which uses Open Data and Augmented Reality to visualise and critique aspects of the Irish financial collapse through an over-layering of the city of Dublin with a database driven data layer identifying properties under the control of NAMA (The National Assets Management Agency).

NAMA is an Irish Government agency[5] established in late 2009 to acquire bad property loans from Irish banks with the aim of removing them from the banks' balance sheets as a bailout mechanism. The agency, which was controversial from the start, acquired properties (or their related mortgages) worth €71 billion but failed in its stated aim of bailing out the banks, culminating in Ireland entering an IMF/EU bailout program in November 2010 due to the imminent collapse of the banking system. Despite (or perhaps because of) its pivotal role in the financial collapse NAMA was very secretive in its workings. Legally exempted from Freedom of Information requirements, the agency was intent on shielding its property portfolio, and the individuals and corporations involved, from public scrutiny under the guise of 'commercial sensitivity'.

Fig. 4.2 *NAMAland* in operation on the iPhone, Conor McGarrigle (2010)

[5] See nama.ie/about-us.

It became obvious that mapping NAMA's property holdings was essential to gain an understanding of the organisation, and the events which led to its creation, in order to open it to scrutiny and critique. The *NAMAland* project, as originally conceived, was to build on Hans Haacke's treatment of the entwinement of the Shapolsky real estate holdings and New York City to create an AR portrait of Dublin seen through the lens of NAMA properties. Through the specificity of such an artistic treatment of the agency it would, I hoped, be possible to build a more generalised critique of the financial bailout in all its complexity. A critique which could demonstrate an approach for addressing the politics of austerity which were sweeping Europe, and at that time concentrated in Ireland as one of the P.I.G.S.[6] countries.

To achieve these results it was first essential to research alternative sources of data on NAMA and its property holding as all official channels were closed. I identified an activist source of information on NAMA properties published on the anonymous website *NAMA Wine Lake*.[7] Maintained as a Google Doc, the NAMA-bound spreadsheet was compiled from published sources of information connecting property developers known to be in NAMA, their directorships of companies, and properties controlled by these companies. Through a process of collating available data sources and correlating them with known information on NAMA the unknown author built a partial picture of the NAMA holdings from this public corporate paper trail. Each entry was well documented with links to its original public domain sources, important in a litigious climate, demonstrating the difficulties of retroactively concealing data already in the public domain. Whilst one can only speculate about the method employed to collate this data it is expected due to its scale that it was produced from automatically data-mining newspaper records and public records of company directorships. This data was, however, locationally vague, street names were typically included with vague descriptors such as "site on Mayor St" but lacked in sufficient detail to automatically geo-tag especially with the precision required for an effective AR application. Building on the *NAMA Wine Lake* research I enhanced this data by manually geo-tagging approximately 120 Dublin properties through visually identifying the sites in person and tagging them with a handheld GPS unit. For legal reasons[8] the database had to be confined to properties which could be located with a high degree of certainty for which sufficient documentary evidence of their ownership could be provided. This data was then used to create a geo-tagged mySQL database to be used as the data source for *NAMAland*.

The application was first built in October 2010 and has been updated on a regular basis since. It employs the *Layar* platform which provides a development environment and software platform to create AR applications which run on the

[6]Portugal, Ireland, Greece and Spain the countries at the centre of the EU's financial crisis.

[7]See namawinelake.wordpress.com

[8]At the time it was unclear what the legal position on releasing this information was so I was advised to refer to properties that were "reported to be in NAMA" rather than in NAMA.

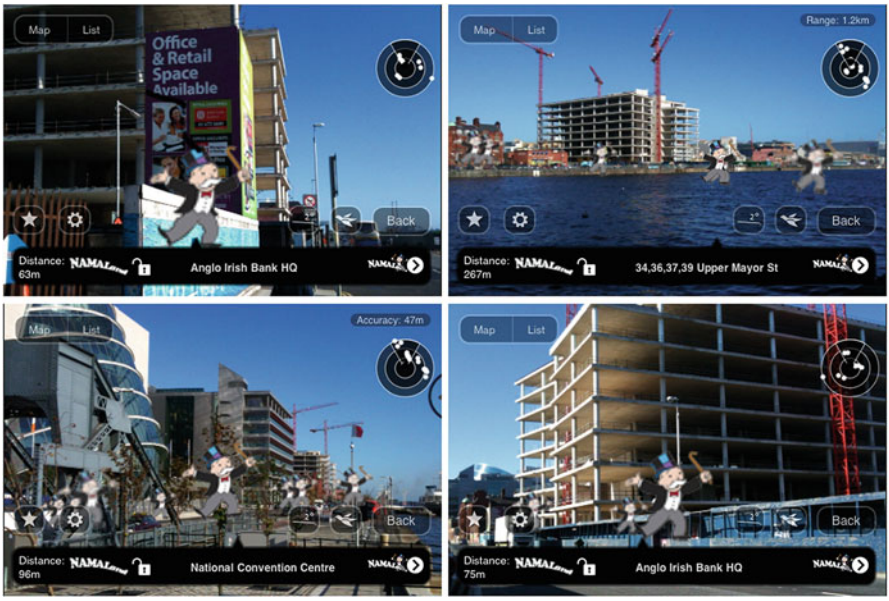

Fig. 4.3 Screenshots showing *NAMAland* in operation in Dublin city centre

Layar App for Apple IOS and Android devices. *Layar* provides a standardised user interface, with limited options for modification, supplying a standard set of AR methods upon which layers can be built. It was selected for two reasons; the first was ease of use, it imports a database effectively and is a reasonably robust working AR app which can be used with a minimum of development. Secondly it provided a method of publishing a politically sensitive work on the iPhone (at the time the most popular smartphone platform in Ireland) as layers are submitted to *Layar's* own approval process and publishing through their proprietary iPhone app, effectively evading the appstore gatekeeping, essential for a politically sensitive app working with grey unofficial data.[9]

NAMAland in operation takes the location of the user's phone and compares it to this database of geo-tagged NAMA properties within certain defined ranges (Fig. 4.3). An overlay of properties within the specified range is then created which can be further interrogated for ownership details (the majority of properties in NAMA are associated with a small number of individuals with vast property holdings and billions in defaulted loans). The location of each response is indicated by an overlay of a cartoon "Monopoly Man" figure over NAMA properties in the camera-view of the user's device. It also generates a real time map of localised NAMA properties along with a list of nearby properties and their locations. *NAMAland* thus visualises the extent of NAMA property ownership, allowing users

[9]See Zittrain (2011) for an account of Apple's gatekeeping.

to identify nearby properties and interrogate specific regions of the city for NAMA connections. It was the first mapping of NAMA properties available and is still the only available mapping of NAMA properties available in Dublin.

4.4 Reception and Activation

NAMAland succeeded in capturing the popular imagination in Ireland. It was widely reported in the mainstream media, including a report on the Nine O'Clock TV News on RTE (the Irish national broadcaster), I was interviewed for numerous radio shows and the project was widely featured in the print media. The title *NAMAland* has even entered common usage as a descriptor for the post IMF bailout situation. In the midst of this extended "15 minutes" of fame the project has more importantly succeeded in focusing attention on its subject matter where more traditional approaches failed. It overcame official attempts to limit information and discussion on the subject, and has acted as a conduit through which concerns over the lack of transparency inherent in NAMA could be expressed.

On one level it operated as a mobile app, a ready-to-hand source of information locating NAMA properties, as a myriad of other apps locate coffee shops and restaurants, gaining in excess of 65,000 users in the process. However as an intervention, a physical dimension to the work was of the essence. The data layer which was enabled though AR was only of significance when overlaid over real space, this is the essential quality of AR, this connection between the virtual geo-tagged dataset and the physicality of place. AR must of necessity operate in conjunction with physical actions to be effective, augmenting space rather than recreating or virtualising space, and as such is the ideal companion for interventionist practices as it redefines the practices through extending and supporting their essential aspects rather than substituting a less effective alternative. The AR structure of the project was always designed to be an enabling framework upon which a range of additional actions, interventions, discussions and so forth could be based. *NAMAland* was extended to include real world events such as walking tours, situated public discussion forums, public speaking engagements, media coverage and individual interventions with the work itself being an amalgam of all its constituent components. These were all supported and enabled through the data layer made visible through the application of AR technology and offered multiple points of entry and modes of engagement with the project which were not necessarily technologically dependent. This ensured that the work remained open to as broad a constituency as possible, including those without the requisite technology to view the AR.

Indeed as the project disseminated it became clear that many of the people who spoke to me of the project were not actually users, as they didn't have a phone capable of running the application. Their experience of the project was second hand, passed to them as a story which resonated as a tale of resistance. Somebody had used mobile technology to reveal a list of NAMA properties despite efforts to

keep this information from the public. It didn't seem even necessary to see it in operation, it was enough to know that it had been done. The walking artist Francis Alÿs speaks of his work as myth making, he sets out to "keep the plot of a project as simple as possible so that it can be told as a story, an anecdote, something that can be transmitted orally without the need to have access to images" (Godfrey 2010). *NAMAland* similarly has a simple narrative that can be told as a story, which means that even without access to the requisite technology the project still succeeds at some level. Not only does *NAMAland* recount a story about NAMA and its consequences, but from the point of view of AR it speaks of the technology and its uses. For this emergent technology this is significant for it is through practices that functions and usage modes of technologies come to light and their relative value and importance are revealed.

At another level it acted as a catalyst, facilitating a range of conversations, debates and activities as part of a wide ranging critique of NAMA and the sequence of events which led to it. The project crossed boundaries from art to geography, urbanism, activism, open data, economics and politics as one would expect from work which engages critically with the space of the city and international finance. As the project became known through publicity and word of mouth another side of the project was revealed from the diversity of the discussions, from the Occupy Dublin camp one day to city-sponsored seminars on Open Data and the smart economy the next, this was its ability to function as a conduit which reconnected NAMA with the space of the city, a connection which had been deliberately severed, to preserve the idea of the agency as a by-product of obscure international financial dealings. What *NAMAland* contributed was an opening up of previously unavailable data and a re-connecting of this data with the fabric of the city itself. This served to add specificity in place of generalisation, fuelling debate through the provision of an infrastructure on which specific spatial critiques could be structuring. This specificity, that is the ability to overlay contextual information at the site, enabled an alternative reading of the city providing a framework for intervention whilst countering the abstraction of space fostered by the narrative of the financial crisis as collateral damage of complex international financial transactions.

4.5 Peripatetic Activism

The project was accompanied by a series of walks informed by the mobile application which took place in Dublin City Centre and in Tallaght, two areas characterised by a high concentration of NAMA properties. These were public, as with the *NAMA-Rama* walk in conjunction with Market Studios (Fig. 4.4), the *In These Troubled Times* walk with RuaRed Arts Centre and *Ireland after NAMA* with The Exchange Arts Centre, and private such as the guided walks for RTE News and

Fig. 4.4 NAMA-*Rama* walk in Dublin's docklands

Channel Four News TV crews.[10] *NAMAland* is essentially a walking project, albeit facilitated through AR technology, it is necessary to deploy it on the street for it to operate at all. The guided walks, through careful selection of routes, were able to maximise this impact by proceeding through areas of the highest concentration of landmark buildings and, as participatory events, functioned as walking forums facilitating participants in discussing the issues represented by NAMA and its property portfolio. In this way the project connected the abstractness of the dataset to the space of the city through a narrative contextualisation which emanating both from the framing of the walks supplied by the artist but in a more significant way from the engagement of the participants. NAMA represents a complex system of abstract financial dealings, transactions which have become so disconnected from everyday understanding but yet have significant and very real consequences. Whereas the narrative of NAMA was the narrative of the (now defunct) property market, international finance and IMF bailouts, *NAMAland* reconnects this to real spaces exposing their interconnectedness and the real consequences on the space of the city and in the lives of its inhabitants. The interventions which *NAMAland* facilitated are thus framed and enabled though the production of a hybrid space which deploys augmented reality and data overlays to re-imagine the urban intervention as the generation of data rich hybrid spaces which can materialise and dissipate with the ebb and flow of the chosen dataset.

[10]See walkspace.org/namaland/news.html for details of these events

NAMAland on one level exists as a mobile app which over-layered the city with a contextual data layer re-presenting the city as a network of property and interconnected financial transactions which have bankrupt a nation. The ambition for the project was that it move beyond a purely oppositional stance. Generalised protest had at this stage been normalised and was easily countered by a narrative which invoked the need to move forward and rebuild, for change to come from the crisis it seemed necessary to set the agenda and shape that change. This is the benefit of a data-led approach, because of the specificity of the data-informed critique the alternative narrative is immanent to the critique itself.

Through data and the locational immediacy of AR *NAMAland* sought to recount a narrative of the city which ran counter to the official version, through revealing, contextualising and crucially locating the NAMA data in the space of the city and letting the users' perform their own interpretation and form their own analysis. In this data-built account the data established the foundation and the narrative was constructed, not by the artist, but through this act of participation. Themes which emerged from the project were the question of data transparency in particular the need for NAMA data be made available for public scrutiny, and the demand for vacant NAMA properties to be made available for community use. These themes, which were central to the project's public events, were widely taken up at a community, activist, academic and ultimately at a political level resulting in substantive changes to the situation.

4.6 Open Data

NAMAland was built on open data which was augmented with location information, in turn this data inspired further projects demonstrating the power of data to enable a myriad of approaches and interventions from mobile apps to occupations (Fig. 4.5). In late 2011 I came into contact with groups associated with the Dublin Occupy movement who were at the time interested in extending their campaign into occupation of NAMA buildings. This was a research-based project which stressed the accuracy of their data. The focus of their campaign was to call for the unlocking of a public resource for community and social usage so it was vital that their targets were correctly identified. The campaign was built on *NAMAland* data augmented with additional research. Their campaign resulting in a series of short lived occupations beginning in January 2012 which highlighting the fact that many NAMA properties were vacant and decaying due to neglect while there was a shortage of affordable space for community groups. A secondary guerilla program of identifying NAMA properties through affixing banners to their exterior was begun which once more drew attention to the neglect of these properties calling for them to be made available to social and community groups. These became part of the general conversation on NAMA and have achieved results, both through foregrounding the issues of NAMA properties and their usage and in opening access to properties.

Fig. 4.5 Welcome to NAMAland banner in Dublin

NAMAland through its activation of these sites has informed and influenced groups and through a focus on locational specificity supported by data has introduced new approaches to the urban intervention as artistic and activist tactic. The project has acted as a resource on which further actions can be built and the cumulative effect of these interventions and their surrounding debate has achieved some concrete results. Dublin City opened direct negotiations with NAMA to access vacant properties under their control for social and cultural use. This has resulted in a city program which allocates vacant buildings for cultural uses with substantial premises being made available. This has been accompanied by the release of more information on NAMA property which, while not nearly complete, has fed the growing demand that vacant properties be opened for community use.

4.7 The Future of AR Art

If we step back from the particularities of the platform and the case study to consider the implications of this project and similar practices on our understanding of the practice of AR.

I argue elsewhere (McGarrigle 2012) that artistic practices which engage with emergent technologies are involving in a process of shifting the understanding of these technologies. As Richard Coyne puts it "technologies do not conform politely

to predetermined or intended functions" (2010: 4), rather it is through use that functions and usage modes come to light and their relative value and importance is revealed. AR as it stands is being promoted as a marketing technology, with the principle AR browsers developing corporate tie-ins using image recognition to replace QR codes in conjunction with location based AR applications. The technology is being thus presented and developed as a method of connecting companies with their customers in real space. While these applications will be a feature of the mature practice of AR, they are, to invoke the developers of the *Urban Tapestries* public authoring project, "unnecessarily impoverished" (Angus et al. 2008: 44–51).

Art practices have a role to play in broadening the understanding of technologies' application through expanding their range of application and permitted usages. *NAMAland* demonstrates one such application, but the potential for these tools is only limited by the datasets which can be accessed and the desire by artists and activists to engage with them as part of their practice. At an everyday level this might be the difference between AR enabling a retailer to deliver location-aware special offers and deals to a customer's phone alongside the ability of the user to interrogate the retailer's history on a range of issues from health and safety to their environmental record or simply customer satisfaction. This is not necessarily to privilege one over the other. Both have their place but what is of the prime importance is that multiple options co-exist as aids to informed decision making, where the user can offset say a welcome discount earned by checking-in against the company's anti-union policies.

NAMAland is an application of AR technology which has reached a wide audience through usage, mainstream media accounts and word of mouth by addressing specific local issues (with arguably a wider import). This success establishes AR as a tool of political and artistic critique which can reveal and situate information of political and cultural significance. *NAMAland* points toward the potential for the development of artistic and activist practices which expand and re-define the praxis of urban intervention through the ability to identify and activate site through the deployment of AR techniques, supported by contextual static and real-time data, to produce a hybrid convergence of geographic space and data space. This ability to generate site specific data rich hybrid spaces assumes a greater importance when connected to the Open Data movement and the popularisation of data scraping techniques with services such as Scraperwiki[11] and the growing community of data journalism advocates sharing techniques.[12] As new sources of data become available there are opportunities for artists and activists to go beyond the rhetoric of the smart economy and develop critical narratives and interventionist strategies based on this newly liberated data. If AR art practices are to shape the technology, expand the range of practices and establish the technology as a tool for enhancing and critiquing

[11] See scraperwiki.com

[12] See, for example, Data Driven Journalism publishers of the Data Journalism handbook datadrivenjournalism.net

everyday life, then these practices must resonate with their audience and assimilate themselves into the technology through establishing meaningful connections to the everyday. This is a challenge for AR art and one that can be addressed through the astute use of data.

References

Angus A, et al. Urban social tapestries. IEEE Pervasive Comput. 2008;7:44–51.

Bell G, Dourish P. Yesterday's tomorrows: notes on ubiquitous computing's dominant vision. Pers Ubiquitous Comput. 2007;11:133–43.

Caudell TP, Mizell DW. Augmented reality: an application of heads-up display technology to manual manufacturing processes. In: Proceedings of the twenty-fifth Hawaii international conference on system sciences, vol 2. IEEE Computer Society Press, Los Alamitos; 1992. pp. 659–69.

Coyne R. The tuning of place: sociable spaces and pervasive digital media. Cambridge, MA: MIT Press; 2010.

Deutsche R. Evictions art and spatial politics. Cambridge, MA/London: MIT Press; 1996.

European Commission. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Open Data An engine for innovation, growth and transparent governance. European Commission. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0882:FIN:EN:PDF (2011). Accessed 15 Dec 2013.

Feiner S, Macintyre B, Höllerer T. A touring machine: prototyping 3D mobile augmented reality systems for exploring the urban environment. In: Wearable computers. Digest of papers; 13–14 Oct 1997. p. 74–81.

Godfrey M. Francis Alys: a story of deception. London: Tate Publishing; 2010.

Golden D. Mark Lombardi, art critical. http://www.artcritical.com/2003/11/01/mark-lombardi (2003). Accessed 15 Dec 2013.

Harrison S, Dourish P. Re-place-ing space: the roles of place and space in collaborative systems. In: Proceedings of the 1996 ACM conference on computer supported cooperative work. ACM, New York; 1996, p. 67–76.

Kluitenberg E. The network of waves living and acting in a hybrid space. Open. 2006;11:6–16.

Manovich L. The poetics of augmented space. Visual Commun. 2006;5:219–40.

McGarrigle C. The construction of locative situations. Dissertation, Dublin Institute of technology; 2012.

Open data. Unlocking innovation and performance with liquid information. McKinsey & Company. http://www.mckinsey.com/insights/business_technology/open_data_unlocking_innovation_and_performance_with_liquid_information (2013). Accessed 15 Dec 2013.

Richard F. "Obsessive—Generous" toward a diagram of Mark Lombardi. Williamsburg Quarterly, Winter 2001/2002.

Russell B. Karosta workshop notes. RIXC Reader. http://www.rixc.lv/reader/txt/txt.php?id=282&l=en (2003). Accessed 15 Dec 2013.

Thomas B et al. A wearable computer system with augmented reality to support terrestrial navigation. Second international symposium on wearable computers, 1998. Digest of papers (1998), p. 168–71.

Wegener M. Mark Lombardi – death defying acts of art and conspiracy. Dir. Mareike Wegener. Unafilm; 2011. Film.

Zittrain J. The personal computer is dead. MIT Technology Review. MIT Technology Review. http://www.technologyreview.com/news/426222/the-personal-computer-is-dead/ (2011). Accessed 15 Dec 2013.

Part II
Augmented Reality as a Novel Artistic Medium

Chapter 5
The Aesthetics of Liminality: Augmentation as an Art Form

Patrick Lichty

5.1 Introduction

Over the past 15 years to its emergence in the 2010s as an art medium, Augmented Reality has developed as a number of evidential sites. As an extension of virtual media, it merges real-time pattern recognition with goggles, finally realizing William Gibson's sci-fi fantasy, or handheld devices. This creates a welding of a form of real-time video and virtual reality, or an optically registered simulation overlaid upon an actual spatial environment. Commercial applications have been numerous, including entertainment, like the Esquire Augmented Reality issue, sales in terms of Costco (an American big-box retailer) in their latest AR-enhanced in-store magazine, to navigation such as Oakley's AR-equipped ski goggles. And even though AR-based works can be traced back into the late 1990s, much of this work required at least an intermediate understanding of coding and tethered imaging equipment from webcams to goggles. It is not until the advent of marker-based AR possessing lower entries to usage, as well as geolocational AR-based media through handheld devices and tablets that Augmented Reality as an art medium would begin to propagate. While one can make arguments that much AR-based art is a convergence between handheld device art and Virtual Reality, there are gestures that are specific to Augmented Reality that allow for its specificity as a genre. In this examination, we will look at some historical examples of AR, and critical issues of the AR-based gesture, such as compounding of the gaze, problematizing the retinal, and the representational issues of informatics overlays. This also generates four gestural vectors analogous to those defined in *The Translation of Virtual Art* (Lichty 2014a, 445), which we will examine through case studies. Through these studies, it is hoped that a deeper understanding of an augmented semiotics can be achieved.

P. Lichty (✉)
University of Wisconsin, Milwaukee, Digital Studio Practice
e-mail: plichty@colum.edu

V. Geroimenko (ed.), *Augmented Reality Art: From an Emerging Technology to a Novel Creative Medium*, Springer Series on Cultural Computing,
DOI 10.1007/978-3-319-06203-7_5,

5.2 The Gaze, the Overlay and the Retinal

In the creation and 'performance' of AR works, there are often two actions in place, and those are of gaze and gesture/positionality. The reason why I separate the two, although related, is that in the five modalities/gestures that I wish to discuss (Fiducial, Planar, Locative, Environmental, and Embodied), each has different relationships between the user, the augment, and the environment. That is, in the experiencing/performance of AR, there is placement of one or many elements between the eye and the recognized target, and the gaze of the agent in experiencing the piece. I will refer to the AR media in question as a 'piece' or 'installation', as the bulk of this discussion has to do with art, but some exceptional commercial examples will be included. In *The Translation of Virtual Art,* I defined the gestural lines of intent, or 'vectoral gestures' as being a line of flight between the origin of the work and the site of the intended audience. These consisted of four modalities, being wholly in the physical or virtual, or gesturing from one to the other (or a combination). AR is a different set of configurations.

The difference inherent in AR from VR is that while there is virtual content, that content is overlaid upon a visual representation of the physical. It would be simple to theorize an intermediate plane of representation between the viewer and the target as n the case of the Planar modality, but unfortunately, AR is not that straightforward. Depending on said modality, there could be a space-matrix of locative or interactive media, a space imposed on a marker, as well as one or more spatial planes between the viewer and the target (as in print, which I discuss as the Fiducial and Planar).

AR consists of a space of positional overlays, whether locative or recognized, and a performative gestural gaze, especially in the case of goggles or handheld/tablet works, as we will observe in Darf Design's *Hermaton*. In addition, I would like to put forth a proposition regarding Duchamp's idea of the 'retinal' and an argument for his *Fountain being* a predecessor to augmented art in 1917 with his addition of the signature (Craft 2012, 202). However, this comes into play only after considering notions of the gaze and of what I will call overlay-space. But when aiming a camera of any sort, the argument of the "gaze" emerges in critical discourse.

In order to address the notion of lensed or gestural view (and perhaps I combine these two together a little casually, they are linked in the case of AR), Laura Mulvey's seminal essay, *Visual Pleasure and Narrative Cinema* (Mulvey 2004, 837–849) comes to mind. In it, she established the concept of the all-objectifying 'male gaze' that gendered the vector of the film lens as one between the subject (female) and objectifier (male). However, with the pervasiveness of personal imaging through mobile devices, Queer Theory and other theoretical frameworks have complicated this discourse. It is for this reason that I feel that as the gaze has been democratized, but manufactured by hegemony, and the 'Queering' of Augmented space deserves its own essay. As such, I feel it is beyond the scope of this humble musing. However, I will touch on this momentarily as an invitation for further discussion.

Since the age of writing *Visual Pleasure and Narrative Cinema,* there are a number of aspects to the human employ of imaging equipment that complicate the gendered subject/object relation. The first, and perhaps an alternative strategy to Mulveyan discourse, is that of personalization of the gaze. With the rise of personal imaging devices, such as iPads and smartphones, the politics of the gaze is bifurcated between the (relatively) "democratized" operator and the hegemonic institution of the manufacturer. While I feel it is more germane to consider the role of the operator in creating the gaze-vector or line of sight of the gaze, the manufacturer is important as well. For it is the manufacturer that designs, and if one still believes Bauhaus idea of form and function, it also frames the narrative discourse of the device itself. And as a male-dominant culture, technology may reify Mulvey's assertion of a phallocentric gaze, even to AR, but this may shift in that the design field is more gender equal than Silicon Valley culture. The approval of the design by the manufacturer reinscribes the agenda of the device, and here I believe Mulvey still wields much power. However, my first notion of the locus of the operator is where this discourse diverges from gendered film theory (or at least Mulveyan discourse).

The semiotic space of AR is peculiar in that it is a potentially fluid one, dependent on any number of factors. Depending on modality, Fiducial, Planar, Locative, Environmental, or Embodied, the relationship of the viewer's position to the subject can be quite relative, interactive, or locative. For example, consider a user in a geolocative installation with, for example, an iPad. Any media is relative to the viewer's location, point of view, and how the infoset overlays itself on the "picture plane" of reality as represented by the device's camera and the AR application. Consider if that media is in itself dynamic if interacted with, the chain of signification separates from what Duchamp called the merely "retinal" and becomes haptic as well. The relationship of the viewer, landscape and media infoset compounds the point of view through multiple points of interest (POIs) in the landscape, sliding into a Massumian constant state of becoming (Massumi 2002, 37), as the relation of the viewer and the multiple planes of subject constantly reconfigure into their new positionality. These are, at least in the case of locational and interactive AR, the problem of the fluidity of becoming-signification in relation to the landscape/mise en scene. In the case of the planar mode of augmentation, the target is often static and the relation is a simple overlay of the augment over the given recognized signifier. Now that I have at least alluded to the complexities of the relation to media in augmented spaces, their modalities are subject to study.

5.3 The Structure of the Gesture in Augmented Reality Art: Fiducial, Planar, Locative/GPS, Environmental and Embodied/Wearable

Augmented art is actually a catchphrase for at a number of different technologies for overlaying virtual content on actual scenery since the term's coinage by Caudell and Mizell at Boeing in 1992 (Caudell and Mizell 1992, 659–669). In this essay, I will

propose five categories of augmentation, and if any are overlooked, I hope it will be because of new developments since this writing. These techniques consist of the five categories mentioned above, Fiducial, Planar, Locative/GPS, Environmental and Embodied/Wearable. While some of these categories overlap or may have indistinct boundaries, such as the intersection of the fiducial and planar recognition, it is hoped that they give the critical scholar studying augmentation a discursive toolset. Each of these modalities situates the viewer, content, and overlaid environment in ways that create specific gestures of media delivery.

When speaks about gestures in AR, I reference two of my other essays that take a similar analytical approach to examining situations involving virtual media, *The Translation of Virtual Art* (Lichty 2014a, 444–462), dealing with art in virtual reality, and *Art in the Age of Dataflow* (Lichty 2013a, 143–157), which examines the development of electronic literature since Joseph Frank's theorizing the notion of Spatial Literature in the 1940s (Frank 1991). My contention is that there is there is an origin, content, and Arakawa & Gins' concept of a 'landing site' (Hughes 2012) for the augmented gesture, which is a destination in a process of communication, but not necessarily a basic sign/signifier relationship. The reason for this is that in AR, although there *can* be these simpler situations between the viewer and media, like planar recognition calling forth video overlays, there are others such as dynamic media in GPS-based/locative installations. These include interactive environments like Darf Designs' *Hermaton* installation, which I will discuss in the Environmental section. As in *The Translation of Virtual Art,* the AR gesture varies in its relationship between origin and receiver, from double signification in the case of Fiducial and Planar, to a dynamic semiotic matrix of constant becoming-meaning in the case of GPS/Locative applications. What I will attempt to do is to progress from a more basic/historical framing of AR mediations and 2D situations, unpacking the gesture into more complex sites of engagement, with the understanding that there will be some examples that overlap and double themselves within my categories. These categories are presented as propositions that are used as 'handles' from which a discussion of the different forms of augmentation can be formed.

The 'gesture' as I call it, consists of a line of attention/flight between the interactor and the superimposed media overlaid on the given environment, such as attention given to a piece of media situated in 3-space, or by orientation as in the case of fiducial tracking. As one can imagine, the semiotic relationship between the interactor, the environment, and the augment becomes complex, as simple media overlays become multi-faceted interactive experiences to dynamic augmented spaces that can be updated on the fly.

5.3.1 Fiducial AR

One of the earlier forms of Augmented Reality is that which uses a specific digital, or *fiducial,* marker that gives a unique signature to an objective 'seen' by a computer camera. This was the primary form of tracking for the works I first saw in the

Fig. 5.1 *Augmented Groove,* Berry and Poupyrev (1999)

mid-to-late 1990s and especially the work using the ARToolKit and the work coming from ATR Kyoto. The fiducial marker gives information for 6 degrees of orientation (XYZ orientation, pitch, roll, yaw) and locates the AR content easily in 3-space. My first introduction to AR was Berry & Poupyrev's *Augmented Groove* (Berry and Poupryev 1999), developed at the ATR Kyoto research lab, shown in Fig. 5.1. This work was, in essence, an augmented DJ station in which participants could make audiovisual mixes through the manipulation of vinyl albums with fiducial markers printed on them. From the documentary video, the user is presented with a character sitting atop the dial on the record, which changes orientation/values through tilt, rotation, etc. As Berry and Poupyrev write in the work's statement: "The performer modulates and mixes compositions by manipulating real LP records. The motions of the records control filters, effects and samples dynamically mixed in and out of the groove. A composer can assign any element of composition to any record, and simply removing one record and bringing in another controls the song progression. Effects, filters and sample triggering are all assigned to any of the four record movements and can be controlled interactively using simple physical records rather than numerous dials and sliders" (Kaltenbrunner 2003–2014).

Considering this work was conceived in 1999, it radically predates environments like the Music Technology Group's Reactable in Fig. 5.2 (Jorda et al. 2005). Groove used an overhead camera, as opposed to the latter piece's use of cameras underneath a translucent table as in the case of the Microsoft Surface tabletop computers. Augmented Groove showed the use of fiducial markers as controls, but one of the more popular demos of 3d overlaid media would emerge through videos of demos of ARToolkit proofs of concept using a particular animated character.

Fig. 5.2 *Reactable,* Jorda et al. (2005)

This viral example of a pop-cultural fiducial AR application is the fusion of the free program Miku Miku Dance and AR Toolkit. To understand the confluence of elements to lead to the profusion of videos of "anime" character Hatsune Miku dancing on fiducial marker cards, a little cultural unpacking is in order.

AR Toolkit is the product of Hirokazu Kato of the Nara Institute of Science and Technology in Japan, created in 1999. However, it took 2 years for it to be released by the University of Washington's HIT Lab, with over 150,000 downloads from SourceForge.net, according to that site's statistical tracking (Kato and Billinghurst 1999). It is a series of libraries allowing programmers to orient media to a fiducial marker relative to its appearance through a webcam or other optical input device. By the mid 2000s eligible media included animated 3D content as seen in Fig. 5.3, which leads to the Japanese virtual pop idol, Hatsune Miku.

In many ways, Hatsune Miku is the realization of William Gibson's autonomous virtual pop Idol Rei Toei from his Bridge Trilogy (Williams 2012) in that "she" was released as a character representing a text-to-song program called Vocaloid (Vocaloid.com 2014) by company Crypton, released in 2008. Based on text-to-speech technology developed by Yamaha, Hatsune Miku is the first of a series of Vocaloids to utilize granular synthesis of sampled vocalists (Miku being modeled from the voice of Saki Fujita). What would follow is a series of music videos, especially after the release of *Miku Miku Dance*, a character animation program starring Vocaloid characters, also released in 2008. This would reach its apex in Fig. 5.4 large-scale music concert using imagery developed by UK company Musion, which would also reflect Digital Domain's *Virtual Tupac* spectacle at Coachella 2012 (Verrier 2012).

Fig. 5.3 *Miku Hatsune AR,* late 2000s

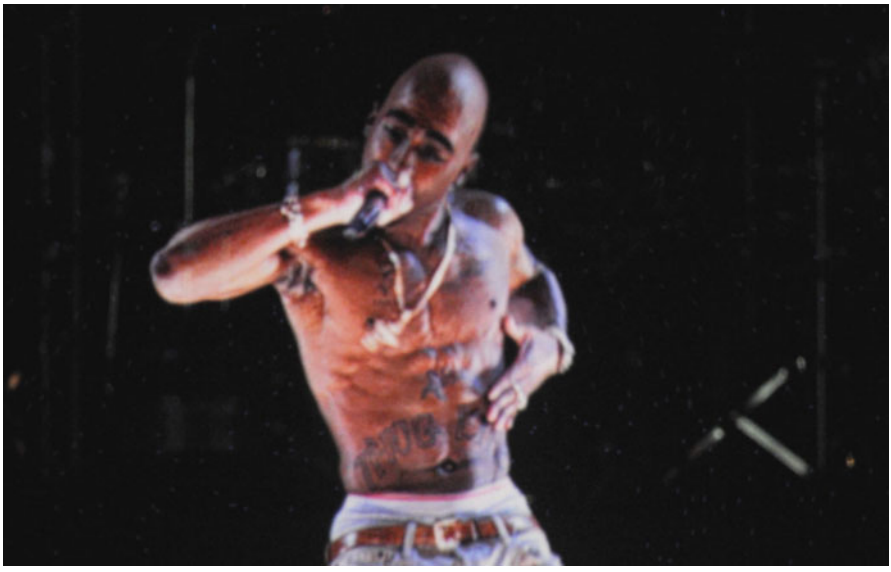

Fig. 5.4 Virtual Tupac (Image courtesy Digital Domain 2012)

The virality of the Miku/Vocaloid technology made her an ideal subject for an AR companion. Since 2009, numerous Hatsune Miku demos based on fiducial markers on paddles would arise, even to the point of applications using the Oculus Rift headset to let you "live" with or sleep alongside Miku. This is more in the realm of what this essay terms as the Environmental or even Embodied/Wearable gesture of AR. This is a step more advanced than the GPS/Geolocative, placing the augment in space through *environmental feature* recognition rather than accessing and external GPS database of Points of Interest (POIs) linked to associated media.

Fig. 5.5 *Occupy wall street AR mask* (Courtesy Mark Skwarek 2011)

New York artist Mark Skwarek created novel uses for the fiducial marker on the body. The first example is the *Occupy Wall Street AR* project, (Skwarek et al. 2011, Fig. 5.5) which was a political intervention by collective Manifest.AR. This intervention took place *in front of* the Stock Exchange, which is unique in that interventions and protest were only allowed in Zucotti Park. The intervention was docented, as passers by were invited to don a helmet with a marker, and when the wearer views himself or herself with the front-aiming camera, they would see the engraved portrait of Washington from the US one-dollar bill instead of their head. Skwarek would reprise this gesture in creating markers for "Virtual Halloween Masks" (Poladian 2013), where anyone could download a given marker and app, and suddenly appear with a skull or jack-o-lantern head (or in their hand or wherever the marker would be placed). These are both wonderfully playful applications of the fiducial gesture. One other artist has used the Fiducial and the Recognition gestures in his performance work, and presents segues between these gestural modalities.

Jeremy Bailey (the "Famous New Media Artist") is a Toronto-based "Artist" who uses markers-based AR in strange and unexpected ways. As Skwarek's placement of the marker on the body induced a straightforward semiotic swap, Bailey makes peculiar formal translations. His *Video Terraform Dance Party* (Bailey 2008), performed in Banff, Alberta shows him bobbing his head around, sculpting a virtual island and populating it with virtual birds and citizens as he narrates their creation. In Fig. 5.6, Bailey remaps his entire face as a faceted television with three "channels" that he controls with the tracking of facial markers that he tries to

Fig. 5.6 *The future of television* (Image Courtesy Jeremy Bailey)

communicate while describing the piece through his stuttering, self-effacing banter in *The Future of Television* (Quaintance 2013),. There are awkward moments, as he calls up a strobing stream and calls it "The Epilepsy Channel", and then thinking better, he tries to 'save' and switches to portraiture of his wife. Bailey then slides into the Planar/Recognition modality with his *Important Portraits* (Smith 2013), which was a Kickstarter project that became a gallery exhibition at Pari Nadimi Gallery in Toronto. He invited "important" patrons to fund the project for a show in which he would use dramatic portraits of the funders as planar markers for dynamic geometric augments. Bailey provides a segue and is important in his manic usage of AR modalities somewhere between a Japanese Mecha Epic and baroque portraiture that has moved from usage of fiducial markers to facial/feature recognition that is hard to categorize.

5.3.2 Planar Recognition AR

Although similar to the idea of the fiducial marker in that it exists on a surface of some sort, the gesture of the planar/feature recognition augment exists as a superset of the Fiducial modality. The Fiducial was specified for its historical significance, but the planar/print/poster form of AR exhibits a broader scope than the digital marker, and in popular media, often performs a more straightforward function. In a TED talk presented in 2012 by the makers of the Aurasma AR technology (Mills and Roukaerts 2012), Matt Mills and Tamara Roukaerts demonstrate the

Fig. 5.7 *Matt Mills' TED talk demonstrating Aurasma technology* (Image Courtesy Aurasma 2012)

recognizing gaze through aiming a mobile device at an image of the Scottish poet Robert Burns, as in Fig. 5.7. By scanning the image, a perfectly overlaid video of an actor, approximating the trompe l'oeil of the painting, appears and begins to orate. While more sophisticated than the fiducial gesture, AR feature recognition of media is often an overlay of content onto print media. Examples are a recent IKEA catalog, allowing users to place virtual furniture in their apartment, or video overlaid in a Costco (an American big-box retailer) circular. All of these augments are, in this writer's opinion, either simpler than or at best equal to a fiducial, creating a simple semiotic swap.

Esquire Magazine also uses this technique in a famous example in its Augmented Reality issue in 2009, 'graced' on the cover by *Iron Man* star Robert Downey, Jr., as illustrated in Fig. 5.8. What was unique about this issue is not only the fact that the fiducial markers summoned a mass of entertaining media through the issue, but reorienting the markers would elicit different responses. Turning the marker sideways would cause Downey Jr. to lounge on his side, playing the raconteur in another way, cause the fashion models to be represented in another season, or call forth another "Joke Told by a Beautiful Woman". This publication used the potential of the fiducial and planar gestures extremely well in not using the orientation of the marker as for mere orientation (tilt, rotation, etc.).

As interactive interfaces emerge in all AR technologies unique possibilities. One other campaign executed through the planar mode of augmentation stands out as having a unique utility of testing medical aptitude from a public audience. Creative agencies VML and GPY&R Melbourne's 2012 *Mobile Medic* campaign for the Australian Defence Force (VML website 2012) consists of a public poster with recognition and augment markers placed throughout the image, as in Fig. 5.9.

Fig. 5.8 *Activated esquire AR issue cover* (Image Courtesy Esquire Magazine, 2009)

Fig. 5.9 *Mobile medic* (Image Courtesy VML 2012)

Potential recruits would perform triage on the mediated "patient" embedded in the poster, and submit their diagnoses/strategies for treatment by analyzing the embedded X-Rays, vital sign waveforms and other media. The Defence Force immediately contacted those scoring highest in the "game", if you could call it that, as possible recruits for their medical corps. This is another example in which,

when combined with developing aspects of interactivity, the Planar AR experience is maturing. But as we unpack the representational modes of AR outward from interacting with planar media, the user encounters AR in spaces. This is where the modalities of Environmental, Geolocative, and Embodied/Wearable AR come into play. The difficulty with studying these forms of mediation and interaction is that they both engage space in different, but equally valid ways. Because of Environmental recognition being closer to the Planar/Fiducial than Geolocative and Embodied AR, this will be our next category.

5.3.3 Environmental/Spatial Recognition

The next challenge that arises from recognizing an image as a fiducial marker is that of recognizing a space from a given point of view. This introduces any number of problems, from perspective to time of day, weather, or occluding bodies in the scene, such as vehicles or other bodies. This has largely left the application of environmental AR to indoor applications that have fewer variables. Of course, outdoor applications in regards to machine repair are part of the original Boeing concept and military applications (Caudell and Mizell 1992, 659–669), but these are close-range situations with very specific, regular spatial configurations. Environmental/spatial recognition applications at the embodied or the architectural scale can present more variables, and present challenges in regards to tracking the environment. For the purpose of discussion, I will present examples that will expand in size, and explore a couple examples of intimate environmental experiences that refer to earlier examples in this essay.

Hermaton (Holmes 2013) is an environmental AR game developed by London-Based Darf Design, founded by Sahar Fikouhi and Arta Toulami that uses a half room-sized cut vinyl mural as marker when presented at an environmental size. There is a "tabletop" version that uses its own marker that fits very well into an advanced category of the feature recognition category, but for the sake of our conversation, the room-sized version in Fig. 5.10 is more germane. As their project statement describes *Hermaton:* "The project uses a buzz wire maze (think: the children's game "Operation") which people can navigate through in real-time, attempting to interact with the digital objects of the "Hermaton" machine. The design of this environment provides both an interactive and performance space which allows the user to fully immerse in a new augmented physical landscape" (Fikouhi and Toulami 2013).

The user controls a small red ball through the maze-like machine, switching on its lights, and progressively activating the *Hermaton.* In addition, the user is placed in what I would call a "performative" media space (Lichty 2000, 352) where the body has to physically stretch, crouch, and twist through the virtual machine. Where I draw the line between performance and performativity in media art, including AR, is the implication of audience in experiencing the piece. In the case of environmental

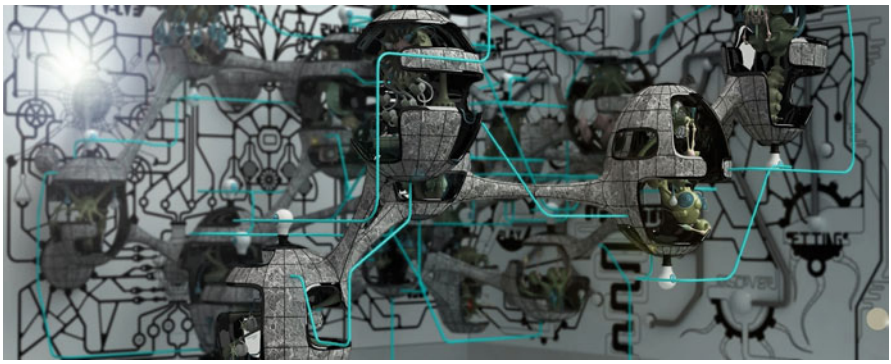

Fig. 5.10 *Hermaton* (Image Courtesy Darf Design 2013)

Fig. 5.11 *McGinness mural augment* (Image Courtesy Heavy Projects 2012)

AR there is a becoming-action in navigating the work, but the existence of audience in the space or not is purely incidental, but there is activation of the space.

Two examples of larger architecturally based AR installations are the Heavy Projects *AR Murals* (Karlin 2011, Fig. 5.11) and this author's large-scale *AR Tapestries* (Lichty 2014b, Fig. 5.12). Each deals with architecture and the cultural histories of the form (the mural and the tapestry) to create a context for the content. By far, Heavy Projects has the larger body of work as they activate existing building murals by turning them into the centerpiece for larger spectacular AR installations. The most notable of these projects were the five murals Heavy augmented and animated at Art Basel Miami 2012 (by How & Nosm, Aiko, Retna, Ryan McGinness, and Momo), and even restored via AR one mural that Shepard

Fig. 5.12 *Into the Wild/Virtual Kenai* (Patrick Lichty 2014b)

Fairey had recently repainted. In the case of Ryan McGinness (the most frequently reproduced of the set), the colorful Haring/Leger-like landscape of bodies formed a frame, and jets of color spew out of the side of the building. Such a simple gesture as the McGinness mural to the explosive Driskill Hotel takeover at SxSW 2013 illustrates the environmentally transformative quality of AR when taken to scale.

Although smaller, the 5 by 21 foot Jacquard-woven tapestry *Into the Wild/Virtual Kenai* is a panoramic composite of online and actual photography taken by this author from a 2009 photographic project in Alaska on the Kenai Peninsula and Adak Island. The piece refers to instruments of power such as the *Bayeux Tapestry*, which depicts the Battle of Hastings, and the culturally transformative nature of the Jacquard Loom at the turn of the nineteenth century much in the way Globalization and mechanization do today. The 5-by-21 foot size is appropriate for depiction of the grandeur of the Alaskan landscape. For augment tracking, it uses QR Codes as web links or fiducial markers, and features like bird flocks and sunlit highlights as recognizable features. The content (doubly accessible in the case of the QR Code) refers to the artist's experience of the Alaskan environmental embarrassment of riches while forces such as oil and mineral industries and global worming encroach this remote part of the world. *Into the Wild/Virtual Kenai,* in its own way, depicts another form of conquest that is the Enlightenment-era notion of the human subjugation of nature, currently termed as the Anthropocene Age (Crutzen and Stoermer 2000, 18). In this way, this work frames itself in a historical context while still forming a critical stance. But other applications root themselves even deeper in history, and reveal exciting potentials for the illustrative power of environmentally-based AR.

Nathan Shafer's *Exit Glacier Terminus AR* shown in Fig. 5.13, and Intracom's (Greece) *Archeoguide* illustrated by Fig. 5.14, reveal two distinct histories, one of Classical Greece, and the other the retreating terminus of the Exit Glacier on the Alaskan Kenai Peninsula. *Exit Glacier,* created for interpretive rangers with the Kenai Peninsula National Park, is a unique application that specifically recognizes the terrain from its own database, as there is little data connectivity at the site, and had to use its own tenuous Wi-Fi transceiver. Exit Glacier is also unique in that it is one of only two walk-up glaciers, and the AR application will show five distinct reconstructions of the glacier face from 1978 to 2013. The challenge connectivity

Fig. 5.13 *Exit glacier terminus AR* (Image Courtesy Nathan Shafer 2013)

Fig. 5.14 *Archeoguide* (Image Courtesy Vlahakis et al. 2002)

problematizes the project with most AR frameworks,. But conversely, the project's ironic Alaskan self-sufficiency presents a certain kind of utility that is particularly useful at the edge of the wireless world.

Archeoguide (Intracom 2010) is another AR application that reveals historical representations of a geographic site. Although the website proposes to document a number of historical sites, the first proof of concept is the site of the Temple of Hera, in Olympia, Greece. As an earthquake destroyed it in the fourth century AD, there is little that remains of the site, except for a few Doric columns. The video documentation on the website shows the Temple as it might have been before its destruction. However, in comparison to the *Exit Glacier* project *Archeoguide*'s documentation depicts an opposite end of the "bell curve" in representing proprietary portable computers, head-mounted displays, and a large wireless server infrastructure. All of these seem more intrusive (and less institutionally viable) to the viewing/gestural experience than the Shafer work, and far more technically "top-heavy" than the glacier tool.

Fig. 5.15 *Miku stay in park* (Image Courtesy "alsione svx" 2013)

5.3.4 Between the Environmental and Embodied: The Return of Hatsune Miku

In this section, the AR applications depicted have ranged from interior architecture to the geologic, but a peculiar subset of environmental applications have emerged in Japan, based yet again on our virtual pop idol, Hatsune Miku. I place them between the environmental and the embodied/wearable modalities as they entail both a Kinect-like spatial camera linked to the headset, making them embodied, but specifically about orienting the subject in the environment. The subject in question is Miku herself, and the applications are *Miku Stay,* a series of experiments to have Hatsune Miku as a happy, live-in girlfriend, and another to take the interaction one step further and situate Miku as a sleeping partner.

In *Miku Stay* (svx 2013)*,* created by a YouTube member named "alsione svx", Miku exhibits complex interactions like walking up to the viewer in a park as in Fig. 5.15, walking around a kitchen, and sitting in a chair (and impressively dealing with occlusion by walking *behind it*) and holding hands. Most of these are accomplished through spatial camera and fiducial markers, but eventually alsione svx mentions that he can't stand using these any more in the video, so he uses environmental cues such as the chair as a marker. She comes over, stands on the bathroom scale, holds hands and then jumps around laughing merrily. *Miku Stay* is a feminist's nightmare, as the app allows the user to live with a hopelessly idealized "waifu" creating expectations unattainable by flesh and blood. If this were not problematic enough, the *Sleep Together* app (*Miku Miku Soine,* Fig. 5.16) by Nico Douga (Tackett 2013) takes this one step further, as Miku becomes the user's

Fig. 5.16 *Miku Miku Soine* (Image Courtesy Nico Douga 2013)

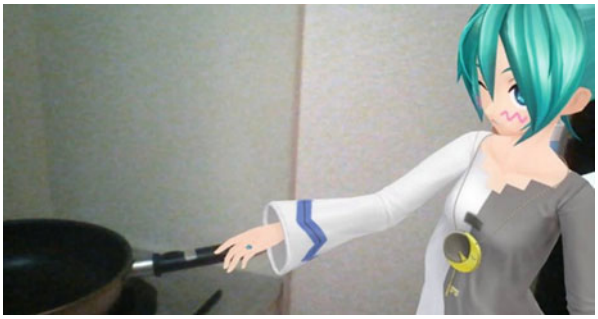

Fig. 5.17 *AR Shot from Hatsune Miku Project Diva F* (Image Courtesy Crypton, Sega 2013)

bed partner, calling them "Master" and comforting them if there is restlessness in the middle of the night.

Awkward at this may seem, if we return to the gesture of locating the subject in space using environmental AR, we find that there is a *second* Miku-as-AR-girlfriend game for the PS Vita, entitled *Hatsune Miku Project Diva F* (Tolentino 2012). The "song-masher" game (as I call the genre of musical coordination games from *Dance Dance Revolution* to *Guitar Hero*) includes a markerless AR app that allows Miku to hang out in your apartment, as seen in Fig. 5.17, and sit on your bed. Is this the isolate hikikomori's dream, or as Josh Tolentino states in *Japanator,* "Mindless waifu ("*waifu"* being a fan term for idolizing an anime character as a possible mate) gimmickry." *Hatsune Miku Project Diva F* is definitely in the area of Environmental AR, but in all these examples, the question remains whether AR suggests what Bruce Sterling calls a "design fiction"(Sterling 2013) to alleviate technological isolation?

5.3.5 Body as Landing Site: Wearable AR

In my 1999 essay *Towards a Culture of Ubiquity* (Lichty 2013c), I trace a trajectory of where interaction/delivery of media/mediated reality would be situated. First is the screen, then into the hand(held) device, then onto the body, and then onto space and architecture. Although wearables and locative technologies have happened far more in parallel than I envisioned, the general trajectory seems on track. There are multiple tectonic lines of creation happening that are overlapping, such as the Oculus goggle/AR and Epson Moverio goggle/Meta AR platforms. One might also argue that Google Glass fits in this category, but I would argue that Glass and its contemporaries are more about hands-free wearable computing than AR. All of these emerging devices are coming, but are also coming into being by tapping into the mass imaginary by the use of design fiction.

In popular culture, the world of AR has given way from science fiction to design fiction, although there are excellent examples of AR as trope in books like William Gibson's *Spook Country* (Gibson 2007, 8), which features a subplot about AR artists depicting the deaths of celebrities at their place of demise. There are plenty of examples in movies as well, from *Minority Report's* dressed-up version of Oblong's user interface (Underkoffer 2010), and the adaptation of Vonnegut's *Harrison Bergeron, 2081* (Crowe 2010). However, as it seems, science fiction is giving way to "design fiction" as a way to capture the popular near-future imaginary. The leading design fiction in 2013 involving the embodied AR gesture, and ironically, the ultimate "chick device" (and I use that phrase with a healthy dose of derision) is *Sight* (Sakoff 2012), a dystopic AR fantasy by filmmakers Eran May-raz and Daniel Lazo. The opening scene finds our protagonist, Patrick, mime-flying in an austere room. In the next shot, we switch to his eyes, which have been equipped with Sight Systems' lenses, which show him playing a flying obstacle course. "Sight" technology has apparently revolutionized life as we know it, from augmenting the contents of the refrigerator to making such mundane tasks as frying an egg or turning cutting vegetables into a "Master Chef" game. The story turns darker as in Fig. 5.18, Patrick goes out on a date, using Sight to choose the ideal wardrobe and social approach using his "Wingman" app. After making a few initial gaffes, Patrick wins his date over, and we find out he is, in fact, an interface engineer for Sight Systems itself. They go back to his apartment for a nightcap, and his date notices that Patrick forgot to turn off his scoreboard on the wall, and sees that he has been using the Wingman, and storms off. This is actually not a problem, as he reveals that the secret feature of Sight is to be able to hack consciousness itself, and this is where my axiom that most authors should not write their last chapter. This is due to the fact that although Sight offers marvelous insight into the probable future of embodied AR, the worn trope of mind control sneaks in. It is also a commentary of technoculture's growing distrust of Sterling's notion of the five global vertical monopolies he calls "the Stacks" (Madrigal 2012), as *Sight* is an obvious commentary on Google Glass taken to its logical extent.

Fig. 5.18 *Sight* (Image Courtesy Eran May-raz and Daniel Lazo 2013)

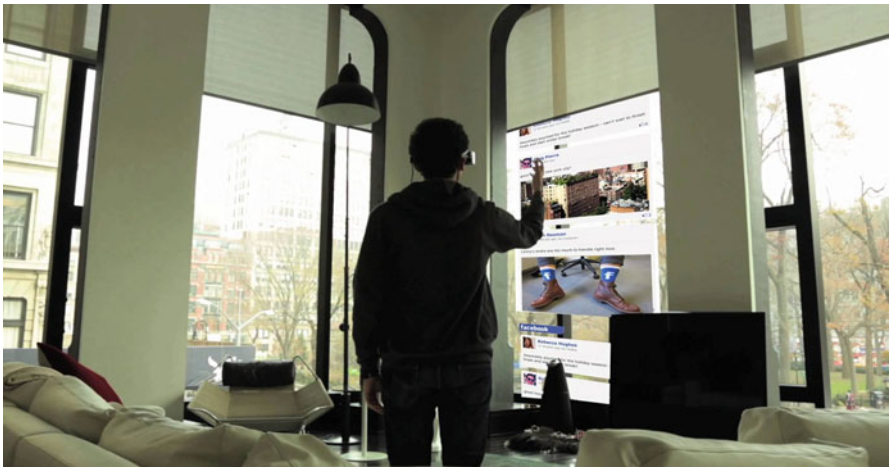

Fig. 5.19 *A morning of meta* (Still Courtesy of Meta, Inc. 2013)

Two (more real) embodied AR platforms also begin with design fictions, as many start-ups do in the 2010s, and are becoming more tangible. Two competing sets of AR glasses are competing for the imagination of the public, mainly Meta, and Atheer. The Meta AR platform was presented much in the vision of *One Day with Google Glass* (Con 2012) in the form of *A Morning of Meta* (Meta 2013, Fig. 5.19). In my essay, *An Alpha Revisionist Manifesto* (Lichty 2001, 443–445), I theorize 8 years prior to this writing, in the future, companies will create pre-prototype narratives and what Sterling would term as 'design fictions' to inspire the funders,

developers and consumers into willing their dreams into being. This video is what I call an "Alpha Revision" proposition that secured crowd-sourced funding and was showing prototypes in the form of the *Meta1* glasses at the Augmented World Expo in 2013. To their credit, Meta also enhanced their credibility by hiring pioneering cyborg Steve Mann at their Chief Scientist.

The competitor, Atheer Labs, also has a compelling design fiction based around *their* glasses, much in the vein of Meta. The glasses both show dynamic augments of the environment, streaming entertainment, and fluid communication, stressing creativity, entertainment, and productivity. Atheer is about a year behind in their crowdsourcing (Miot 2013), and boasts a less expensive product than Meta's proposed Second Generation Meta Pro glasses ($667/developer edition, $3,650 for the Meta Pro (Meta 2014) as of this writing, with both "shipping July 2014"). Although our discussion is about the modalities of augmentation and the relationship of augmented media and users, it's also of interest to note the "six months out" mentality and the gap between pre-order and stated delivery, as well as the proof of concept videos versus the initial design fictions. Admittedly the differences narrow as time goes on, but the reality of Google Glass became far different than the one depicted in *One Day with Google Glass.* Design fictions, such as the PADD from *Star Trek: The Next Generation* becoming the iPad seem to make everyday the notion of science fiction and make it less compelling, as stated by Bruce Sterling in the WELL State of the World Report for 2014 (Lebkowsky and Sterling 2014).

5.3.6 Locative/GPS-Based

The last gesture/modality in AR, and the most complex, is that of Locative/GPS. This is due to the dynamic relationship between the user, the media linked to points of interest in the landscape, and the objective background upon which the media is overlaid. Many variables are in play as the relationship between user, media and landscape as with the Environmental modality, and dynamic content creates a fluid matrix of representations, creating a sort of semiotic pinball machine. Fortunately for our analysis, and perhaps disappointingly for the work itself, most locative AR work consists of overlaid imagery or video on static POIs (Points of Interest). This author understands, as with all our gestural modalities that there are commercial applications, like the fiducial application used in the Esquire Magazine issue that have surpassed many of the artworks in our discussion in leverage of the potential of the medium. In addition, locative AR art constitute the majority of the medium, so only a brief number of works will be discussed here, and apologies to the mass of work in this gestural realm that is elided. For purposes of interest, I would like to discuss installations that address certain topics – politics and geographical annotation. Each throws content in useful or illegal/unexpected places, and creates a double signification of the location through overlay and context.

Political work is one of the smaller genres in AR, although interventions like *We AR MoMA* (Sterling 2010) have used AR to create salons des refuses inside

Fig. 5.20 *Occupy wall street AR* (Image Courtesy Mark Skwarek 2012)

prestigious museums without actually sneaking into the space and nailing the work to the wall. Figure 5.20 *Occupy Wall Street AR* (Holmes 2012), organized by Mark Skwarek for the collective ManifestAR, inserted technically illegal content over the Stock Exchange. The illegality of the gesture is marked by the fact that during the Occupy Wall Street campaign, intervention was only permitted in Zucotti Park, as it private property. So, collective members, (Mark Skwarek, Alan Sondheim, et al.) "docented" the work to passers by, which included flaming bulls, Space Invaders, the Monopoly game plutocrat, and slot-machine wheels between the columns of the Exchange, playing on Brian Holmes assertion of "Market as Casino" (Holmes 2012). What I feel was unique was that the Occupy AR interventions are an art intervention where the "infopower" is not constrained by material or as I call it, "atomic" power (Lichty 2013a, b, c, 53). As mentioned in a 2013 panel on AR as Activism at the festival South by Southwest, the question was posed as to whether law enforcement could demand the reorientation of a locative database if it was representing protest in a restricted space. This question was revisited as this author also penetrated controlled airspace with *Love Bombers,* in which Fig. 5.21 depicts NATO A-10 Warthog Ground Support Bombers, dropping video game 8-bit hearts on the NATO summit in Chicago and the corresponding protesting mobs.

The Occupy metaphor was carried a step further when the team involved with *Occupy Wall Street AR* created *OccupyAR May Day*, in solidarity with International Workers' Day. Where *Wall Street AR* concentrated content in a specific place, *May*

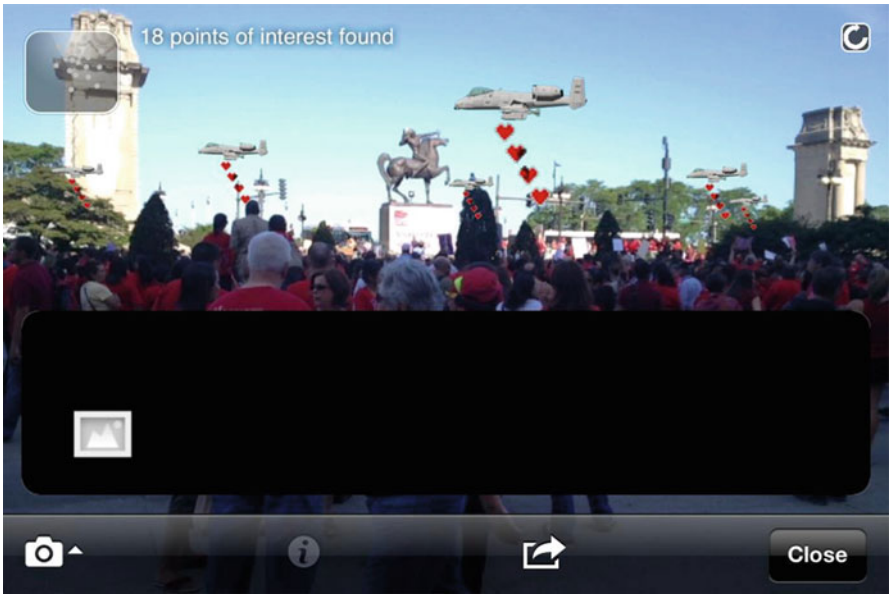

Fig. 5.21 *Love bombers* (Image Courtesy Patrick Lichty and Mark Skwarek 2012)

Day located POIs with Space Invaders, hearts, coins, a 3D model of "All you Need is Love" as shown in Fig. 5.22, and scattered them across the Americas, Asia, Europe, Australia, and Africa (Tunisia). The images on the blog depict images from most of the 40 POIs in the geolocative database, and represent the complexity of gesture between a mobile interactor and a global database, as the relations involve global grand arcs and multiple cultural contexts.

Two other AR augment works that overlay historical content onto geographical environments are Annette Barbier & Drew Browning group collaborative project 2012 *Expose, Intervene, Occupy (EIO)* (Tripp 2012). *EIO* used locative and recognition technologies to insert critical narratives into the downtown Chicago landscape. Examples of the eight AR collaborations include Barbier's *2070* as seen in Fig. 5.23, exploring the progressive invasion of the Asian Carp into the North American Great Lakes through the Chicago River, an alternate historical street sign narrative, and a Mario–Bros. romp by Mat Rappoport that invites the interactor to chase coins through Chicago's Financial Sector in Fig. 5.24. Two other conversational pieces are *PolyCopRiotNode* by Adam Trowbridge and Jessica Westbrook that features an ominous cybercop, commenting on the law enforcement culture of Chicago, and *WeathervaneAR* by John Marshall and Cezanne Charles that has many instances of a "robotically-driven" chicken head, playing of post-Millennial paranoia. Where the *Occupy AR* series had more of a unitary format, *EIO* creates an "anthology" of works describing how AR can be used as a tool of psychogrographic inquiry. Of note is the unfortunate fact that due to the change in

Fig. 5.22 *Legible City2.0/OccupyAR May Day* (Image Courtesy Lichty and Skwarek 2012)

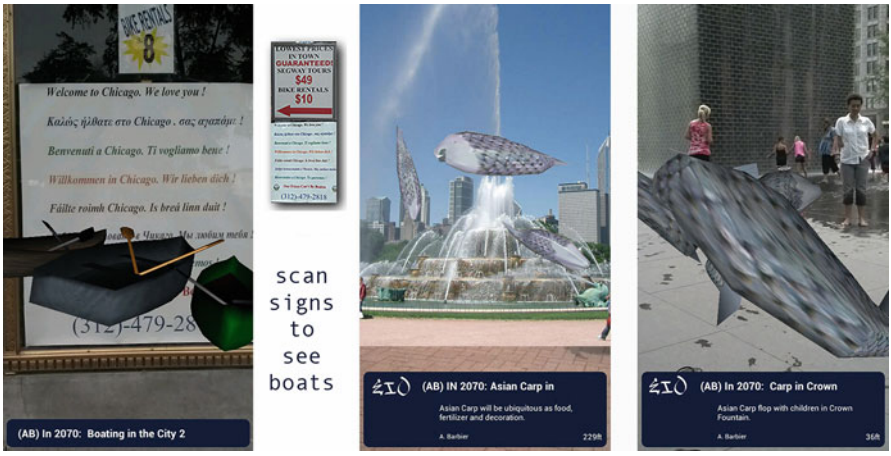

Fig. 5.23 *EIO: 2070* (Image Courtesy Annette Barbier 2012)

policy of companies providing the technological infrastructure for the work (similar to the removal of non-profiting movies from blip.tv in December 2013) *EIO* is now inactive.

The last example of a historic or geographical transnarrative is that of *Virtual Duke* and *Digital Durham* (versions 1,2, &3) (Szabo and Abel 2010–2012) by Victoria Szabo and historian Trudi Abel. The project seeks to create historical

Fig. 5.24 *EIO: Coin Chase* (Image Courtesy Mat Rappoport 2012)

media experiences, more notably using Google Earth and AR in Version 3 to reveal reconstructed representations of historical sites of Raleigh-Durham in AR using geolocative points of interest. This is similar to *Archeoguide,* except with the simpler use of handheld devices. From a 2012 SLSA presentation, the project appeared geolocative, and the documentation site remarks that the project is coming 2 years ago, in 2012.

5.4 Conclusions

By looking at Augmented Reality as a delivery method for artistic content, then investigating it as a frame for mediation, a discussion is opened up that ties deeply into art-historical tradition and novel modes of "becoming". From Duchamp's notion of the "retinal" to Mulvey's masculinization of the gaze and pervasive imaging's fracturing and possible "queering" of the mediated gaze, AR and my proposed gestures/modalities of representation suggest ways in which artists are using AR in service of cultural production. By beginning with historical technologies like fiducial tracking, we can trace an epistemic arc as AR unfolds into image recognition, spatial location, and embodied interaction. As additional layers of interaction are embedded into AR in the handheld and wearable units, more layers of signification are stacked into augments, as evidenced in the case of the *Mobile Medic* application. However it is also important to note that AR as of 2014 is still a medium in its adolescence, as technologies in an "Alpha Revision" state rely on design fictions and crowdsourced bootstrapping to will them into being.

This decade-later extrapolation of my idea of Alpha Revisionism has culture in a state where science fiction begins to pale in light of propositional videos and developer kits for *Star Trek*-like devices. In conclusion, it is this author's hope that he has left points for further discussion, made a discursive framework for the genre, and set up a number of propositional qualia for the study of Augmented Reality. As with all writing on technology, much of this will serve as a record, will inexorably date itself, but it is hoped that some of the principles herein will remain solid.

References

alsione svx. Stay with Miku in augmented reality, web: Youtube video documentation, http://www.youtube.com/watch?v=yRWKFauD6_w&list=UUVUW_vUhHUd_UEtzEysNtCQ&feature=c4-overview (2013).

Bailey J. Video terraform dance party, Banff new media institute performance, Youtube performance video documentation, http://www.youtube.com/watch?v=vNO0l4ppgIY (2008).

Barbier A. In2070, From "EIO" (from "Expose Intervene. Occupy"). Web Documentation, http://iam.colum.edu/abarbier/Expose/EIO.html (2012).

Berry B, Poupyrev I. Augmented groove. ATR Research Labs, Kyoto, Japan http://www.mic.atr.co.jp/sspace/ (1999).

Caudell TP, Mizell DW. Augmented reality: an application of heads-up display technology to manual manufacturing. Proceedings of the 25th Hawaii International Conference on System Sciences, IEEE Computer Society Press. Manoa: University of Hawaii; 1992.

Con M. Google's project glass: experience augmented reality through this video. Web: *Zans Media,* http://zansmedia.com/blog/google/project-glass-one-day-video-augmented-reality-google-x-labs/ (2012).

Craft C. An audience of artists: dada, neo-dada, and the emergence of abstract expressionism. Chicago: University of Chicago Press; 2012.

Crowe J. 2081 review. Web: Revolution SF, http://www.revolutionsf.com/article.php?id=4860 (2010).

Crutzen PJ, Stoermer EF. The 'anthropocene'. Global Change Newsl. 2000; 41:17–8. International Geosphere-Biosphere Programme, Stockholm.

Crypton, Inc. Vocaloid website. Web, http://www.vocaloid.com (2014).

Darf Design (Sahar Fikouhi and Arta Toulami). Hermaton documentation website. Web, http://www.darfdesign.com/132812/1318702/gallery/hermaton (2013).

De Boever A, Murray A, Roffe J. "Technical mentality" revisited: Brian Massumi on Gilbert Simondon. Web Journal, Parrhesia #7, http://parrhesiajournal.org/parrhesia07/parrhesia07_massumi.pdf (2009).

Esquire Magazine. Esquire's augmented reality issue: a Tour (Nov 9, 2009). Esquire Magazine YouTube Channel. Retrieved from http://www.youtube.com/watch?v=LGwHQwgBzSI (2009).

Frank J. Spatial form in modern literature, the idea of spatial form. New Brunswick: Rutgers University Press; 1991.

Gibson W. Spook country. New York: Berkley; 2007.

Heavy Projects. AR Murals. Web documentation, http://www.theheavyprojects.com/projects (2012).

Holmes K. AR occupy wall street: the augmented reality sit-in. Web, The Creators Project, http://thecreatorsproject.vice.com/blog/ar-occupy-wall-street-the-augmented-reality-sit-in (2011).

Holmes B. Profanity and the financial markets. A user's guide to closing the Casino. Berlin: Hatje Cantz Verlag; 2012.

Holmes K. Hermaton: enter the grid is an augmented reality architectural maze. Web: The Creators Project, http://thecreatorsproject.vice.com/blog/ihermaton-enter-the-gridi-an-augmented-reality-maze (2013).
Hughes R. The reversible eschatology of arawakwa and gins. Web Journal, From Inflexions #6. Montreal: Concordia University; 2012.
Intracom. Archeoguide Website, http://archeoguide.intranet.gr/project.htm (2010).
Jorda S et al. Proceedings of the international computer music association. Ann Arbor: University of Michigan Press; 2005.
Kaltenbrunner M. Augmented Groove (description). From Tangible Music, http://modin.yuri.at/tangibles/?list=4 (2003–2014).
Karlin S. Rethinking public space: B.C. Biermann's augmented reality urban art. Web: Fast Company, http://www.fastcocreate.com/1682447/rethinking-public-space-bc-biermann-s-augmented-reality-urban-art (2011).
Kato H, Billinghurst M. Marker tracking and HMD calibration for a video-based augmented reality conferencing system. In: Proceedings of the 2nd IEEE and ACM international workshop on Augmented Reality (IWAR 99), October, 1999.
Lebkowski J, Sterling B. Topic 473: Bruce Sterling and Jon Lebkowsky: State of the World 2014", Web: The Well, http://www.well.com/conf/inkwell.vue/topics/473/Bruce-Sterling-and-Jon-Lebkowsky-page01.html (2014).
Lichty P. The cybernetics of performance and new media art. Leonardo. Cambridge, MA: MIT Press; 2000; 33(5):351–4.
Lichty P. An alpha revisionist manifesto: white paper. Leonardo. Cambridge, MA: MIT Press; 2001; 34(5):443–5.
Lichty P. Art in the age of dataflow. In: Currie M, Riphagen M, editors. Variant analyses: interrogations of new media art and culture. Amsterdam: Institute for Networked Culture; 2013a.
Lichty P. Digital anarchy, social media and WikiLeaks: or, Skynet doesn't look anything like we thought it did, in variant analyses: interrogations of new media art and culture. Amsterdam: Institute for Networked Culture; 2013b.
Lichty P. Toward a culture of ubiquity, in variant analyses: interrogations of new media art and culture. Amsterdam: Institute for Networked Culture; 2013c.
Lichty P. The translation of art in virtual worlds. In: Grimshaw M, editor. The oxford handbook of virtuality. New York: Oxford University Press; 2014a.
Lichty P. Virtual Kenai/into the wild (AR Tapestries). Web documentation, http://www.voyd.com/ (2014b).
Lichty P, Skwarek M. Legible City2.0/OccupyAR May Day. Web Documentation, Web, http://aroccupymayday.blogspot.com/p/artists-and-projects.html (2012).
Madrigal A. Bruce Sterling on why it stopped making sense to talk about 'the internet' in 2012. Web: The Atlantic Online, http://www.theatlantic.com/technology/archive/2012/12/bruce-sterling-on-why-it-stopped-making-sense-to-talk-about-the-internet-in-2012/266674/ (2012).
Massumi B. Parables for the virtual: movement, affect, sensation. Raleigh/Durham: Duke University Press; 2002.
Meta, Inc. A morning with meta. Web: Youtube promo video, http://www.youtube.com/watch?v=p049os77zMk (2013).
Meta, Inc. Pricing. Meta website, Spaceglasses.com, (2014).
Mills M, Roukaerts T. Image recognition that triggers augmented reality. Web video: TED.com, http://www.ted.com/talks/matt_mills_image_recognition_that_triggers_augmented_reality.html (2012).
Miot S. Atheer labs crowdfunds superhero-like 3D smart glasses. Web: PC Magazine Online, http://www.pcmag.com/article2/0,2817,2428601,00.asp (2013).
Mulvey L. Visual pleasure and narrative cinema. In: Braudy L, Cohen M, editors. Film theory and criticism. New York: Oxford University Press; 2004.

Poladian C. Virtual masks could be the future of Halloween costumes, thanks to augmented reality programs. Web, International Business Times, 29/10/13, http://www.ibtimes.com/virtual-masks-could-be-future-halloween-costumes-thanks-augmented-reality-programs-1445884 (2013).

Quaintance M. Patents pending: Jeremy Bailey and the future of gestural interfacing. Web: Rhizome.org, (2013).

Rappoport M. A game we play, (From "Expose Intervene. Occupy"). Web Documentation, http://expose-ar.com/?page_id=50 (2012).

Sakoff H. 'Sight': short film takes Google Glasses to their logical nightmarish end. Web: Huffington Post, http://www.huffingtonpost.com/2012/08/03/sight-short-film_n_1739192.html, (2012).

Skwarek M. AR occupy wall street. From Web Documentation, Web, http://aroccupywallstreet.wordpress.com/ (2011).

Skwarek M. arOCCUPY May Day. From Web Documentation, Web, http://aroccupymayday.blogspot.com/ (2012).

Skwarek et al. Occupy wall street AR. AR Installation, documentation website, http://aroccupywallstreet.wordpress.com/ (2011).

Skwarek M. Virtual masks could be the future of Halloween costumes. Thanks to augmented reality, Blog. http://markskwarek.blogspot.com/2013/11/augmented-views-virtual-masks-could-be.html; August 11, 2013.

Smith G. Important portraits – Jeremy Bailey Kickstarts a solo exhibition. Web, Creative Applications Network, http://www.creativeapplications.net/news/important-portraits-jeremy-bailey-kickstarts-a-solo-exhibition/ (2013).

Sterling B. Augmented reality; invading the museum of modern art. Web: Beyond the Beyond, Wired.com, http://www.wired.com/beyond_the_beyond/2010/10/augmented-reality-invading-the-museum-of-modern-art/ (2010).

Sterling B. Patently untrue: fleshy defibrillators and synchronised baseball are changing the future. Web: Wired.co.uk, http://www.wired.co.uk/magazine/archive/2013/10/play/patently-untrue (2013).

Szabo V, Abel T. Virtual duke and digital Durham (versions 1,2, &3). Web documentation, http://sites.duke.edu/vszabo/projects/virtual-duke-and-durham/ (2010–2012).

Tackett R. Wanna sleep next to Hatsune Miku? There's an app for that! Web: Rocketnews24.com. http://en.rocketnews24.com/2013/10/08/wanna-sleep-with-hatsune-miku-theres-an-app-for-that/ (2013).

Tolentino J. Get Miku into bed with Project Diva F's AR Gimmickry. Web: Japanator, http://www.japanator.com/get-miku-into-bed-with-project-diva-f-s-ar-gimmickry-23496.phtml (2012).

Tripp S. Response to expose, intervene, occupy: a collaboration of ten artists. Web, http://expose-ar.com/?page_id=240 (2012).

Underkoffer J. John Underkoffer: pointing to the future of UI. Web video: TED.com, http://www.ted.com/talks/john_underkoffler_drive_3d_data_with_a_gesture.html (2010).

Verrier R. 'Virtual 2Pac' image wins award for Digital Domain. Los Angeles Times Online, http://articles.latimes.com/2012/jun/25/entertainment/la-et-ct-digital-domain-tupac-20120625 (2012).

Virtual Tupac at Coachella Image, Digital Domain, Web, http://digitaldomain.com/projects/271 (2012).

Vlahakis V, Ioannidis N, Karigiannis J, Tsotros M, et al. Archeoguide: an augmented reality guide for archaeological sites, Computer graphics and applications. Vol. 22, Issue 5. Washington, DC: IEEE Computer Society; Sep/Oct 2002.

VML. Mobile Medic. Web Documentation, http://australia.vml.com/clients/australian-defence-force (2012).

Williams M. Gibson's bridge trilogy, Blog, Stories By Williams, http://storiesbywilliams.com/2012/02/05/gibsons-bridge-trilogy/ (2012).

Chapter 6
Augmented Reality in Art: Aesthetics and Material for Expression

Geoffrey Alan Rhodes

6.1 From Cinematic Apparatus to Augmented Reality Apparatus

Stephen Heath begins his introduction to the collection of essays, The Cinematic Apparatus, with an observation on proto-cinema advertisements: "In the first moments of the history of cinema, it is the technology which provides the immediate interest: what is promoted and sold is the experience of the machine, the apparatus. The Grand Café programme is headed with the announcement of 'Le Cinématographe' and continues with its description: 'this apparatus, invented by MM. Auguste and Loius Lumiére, permits the recording, by series of photographs, of all the movements which have succeeded one another over a given period of time in front of the camera and the subsequent reproduction of these movements by the projection of their images, life size, on a screen before an entire audience'; only after that description is there mention of the titles of the files to be shown, the 'sujets actuels', relegated to the bottom of the programme sheet" (Heath 1980).

The context here, in a compilation of essays inspired by Jean-Louis Baudry's essay "Ideological Effects of the Basic Cinematographic Apparatus," is that after 60 years of critics analyzing film on the basis of dramatic text, aesthetic composition, photographed subject, and psychology, Apparatus Theory in the 1970s had finally codified an analysis of cinema based on its essential unique elements—it's material for expression taken as a whole; what McLuhan would term the Medium not the Message. In Baudry's 1970 essay, he draws a diagram of the 'cinematographic apparatus' delineating the path that the spectators' perceptions normally travel, noting what is emphasized and what repressed. I redraw it here in Fig. 6.1.

G.A. Rhodes (✉)
Department of Visual Communication Design, School of the Art Institute of Chicago, Chicago, IL, USA
e-mail: garhodes@GARhodes.com; http://www.GARhodes.com

V. Geroimenko (ed.), *Augmented Reality Art: From an Emerging Technology to a Novel Creative Medium*, Springer Series on Cultural Computing,
DOI 10.1007/978-3-319-06203-7_6,

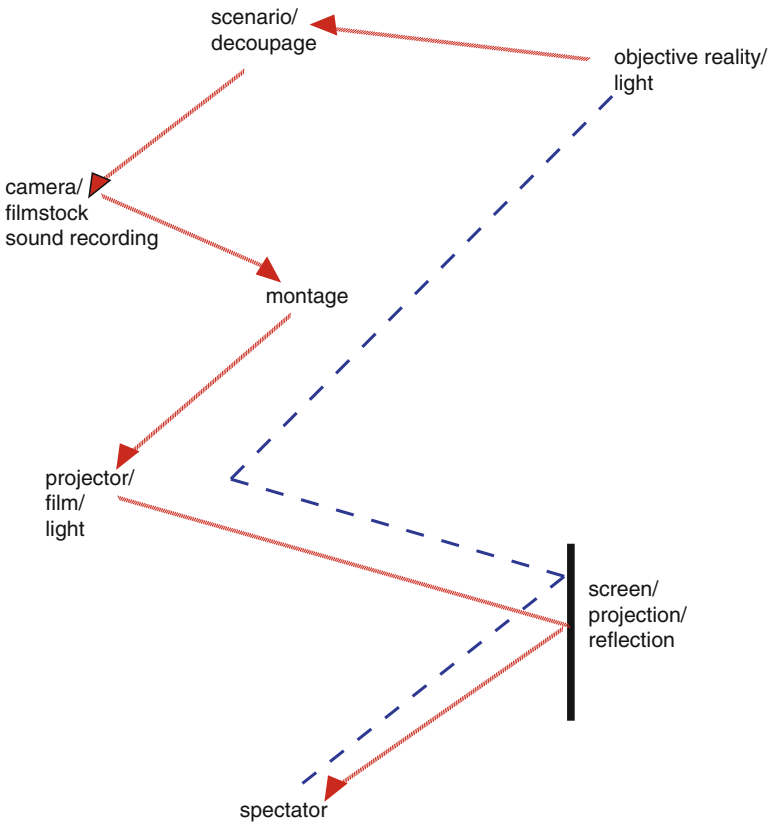

Fig. 6.1 Cinema apparatus (Baudry 1986)

The text in the diagram notes elements of the apparatus: the cinema screen, the projector, the montage/cutting of the film, the principal production of sound and film, the screenplay, the photo-emulsion-captured objects in past reality. We could add many more: the dramatic acting, the framing, the soundtrack and sound looping, the business machinations which create the theaters and distribute the film . . . The solid line draws the path of the cinema information, from staged scene, to framed shot on film, to the editing room, projector, and cinema screen. The dotted line draws the spectators' perception of The Film—that of which the spectator is aware; many of the apparatus elements are repressed in favor of 'suspension of disbelief' and 'persistence of vision' in the cinema experience. In Baudry's diagram there is an emphasis on the analogic quality of cinema—the photographic actuality of it: the viewer feels like they are seeing the actual light reflected by the captured-objects, not seeing a picture of a car, of a beautiful face, of a camel crossing the dessert, but seeing a present car, face, camel. This is not an absolute cinema—the viewer is still conscious of the film-Making, but the dotted line represents the extent to which these different elements are present in the mind of the spectator. It is a sketch of

the cinematographic ideology. The spectator remains aware of the screen—if not, then they might run from the theater when a dinosaur enters frame or a gun is shot. Less so are they conscious of the projector and the beam emanating from it—if dust or smoke obfuscates the beam, or if the film shakes in the projector gate or even burns up, then this drawing attention to the projector would be a failure that 'takes us out' of the experience of the movie. Though vaguely conscious of the editing, the spectator is almost completely unconscious of the filmstock and sound recording choices—if these things are noticed at all it is a failure of production (such as in cheap B-movies where there are jarring changes between film stocks with different grains or scratchy soundtracks). And the same can be said of the scripting and acting—once we notice the acting of the drama or the scripting of the drama we are no longer *in the drama* where we are supposed to be. Artists of the same decade subverted this standard perception through different techniques seeking in the elements repressed within the cinematographic apparatus a fresh material for expression—a material essential to cinema capable of an avant-garde *Acinema*. Anthony McCall created films that emphasized the projector beam. Stan Brakhage made films that emphasized the interaction of the projector light and the material of the film strip itself. Flickerfilm makers like Tony Conrad and Paul Sharits created metrical montage films that emphasized the cutting and rejoining of film strips and their mechanical movement through the projector light. Filmmakers like Jonas Mekus, Kenneth Anger, and Jack Smith made avant-garde films that turned upside-down the emphasized and repressed areas of production, scripting, and performance. Avant-garde film sought to rupture the ideology inherent in the cinematographic apparatus, to create a fresh image capable of inspiring new thoughts, emotions, and politics.

This movement seeking a phenomenology of cinematic apparatus arose in the television era. With the newly wired world, a media philosophy that could encapsulate the connections and circuits of contemporary technology into a conceptual whole was attractive and maybe necessary for survival. McLuhan's analogy, a decade earlier, in *Understanding Media* of sound waves becoming visible just as a plane approaches the sound barrier seems prescient—like much of his book—of the networked age: "The sudden visibility of sound just as sound ends is an apt instance of that great pattern of being that reveals new and opposite forms just as the earlier forms reach their peak performance. Mechanization was never so vividly fragmented or sequential as in the birth of the movies, the moment that translated us beyond mechanism into the world of growth and organic interrelation. The movie, by sheer speeding up the mechanical, carried us from the world of sequence and connections into the world of creative configuration and structure" (McLuhan and Gordon 2003).

We can transpose this analogy to another age and transition—to the networked electric image which began with live video and has been accelerated in AR. Augmented Reality, in all its permutations of live manipulated media, is the first truly network-age screen media—not just movies broadcast over electric wires, or recorded on to digital media, or enhanced through computer-calculated effects, but a medium which takes live media manipulation as its essence and material. With this acceleration, we can look back to excavate the material shift from the filmic image, to the electric one.

I consider the video art of the 1970s, proto-AR. Like the proto-cinema program cited by Stephen Heath, video art in the gallery is defined by its apparatus—the apparatus locates the genre. A Bill Viola video work, represented on James Cohen Gallery's website, describes the artistic material, "Color High-Definition video triptych, two 65″ plasma screens, one 103″ screen mounted vertically, six loudspeakers (three pairs stereo sound)" (for the work, Ocean Without a Shore, 2007). SFMoma, in their web catalogue, gives the genre or medium of Peter Campus' 1975 video art work 'Dor', "closed-circuit color video installation," but to truly locate the work below they note, "A discreet video camera is placed near the entrance, filming visitors entering and exiting the space; their live image is projected onto an adjacent wall." Then it goes on to the "sujets actuels." In description, these are not video works made of light, subjects, scenes, or even images, instead they are configurations of wires, capture devices, and rendering screens. In 1976, as video art came on the scene, Rosalind Krauss wrote the well known essay, "Video and the Aesthetic of Narcissism," which addressed many of the new video works, including the above mentioned 'Dor' by Peter Campus, and hypothesized a fundamental shift in the practice of art and its material for expression. In it, Krauss theorizes that these artists' expressions must be worked through "an object-state, separate from the artist's own being, through which his intentions must pass," like the pigment bearing substances of painting and the matter through space of sculpture: a material for expression that was the artist enmeshed in the media apparatus—a psychological state as material. She defines the crucial element of the looping electric video circuit images of Acconci and Campus as the instantaneity of the communication from notion to message: "This is why it seems inappropriate to speak of a physical medium in relation to video. For the object (the electronic equipment and its capabilities) has become merely an appurtenance. And instead, video's real medium is a psychological situation, the very terms of which are to withdraw attention from an external object—an Other—and invest it in the Self." The object is bracketed out, and instead the artist is creating within a psychological state invoked by the mapping of the mind onto this network; the medium becomes the nervous system. In her analysis this self-gazing video art, such as Vito Acconci's long-take videos, are for the spectator like viewing an electronic and psychological loop between the artist, camera, and screen. Krauss differentiates the video works: installations like Campus' 'Dor' which install the narcissistic circuit within the gallery, and works like Vito Acconci's 'Centers' (a looping pre-recorded video in which Acconci, watching himself in his live video monitor, repeatedly points at the center of the screen, coincidentally at the viewer and the focal point of the art work) which use the narcissistic circuit as a stage for performance that is then played back in the gallery. One is documentation of an apparatus and the other installation of apparatus in which the viewer is immersed. Like avant-garde film, these works seek to reveal the apparatus to the spectator—the perception and the construction are identical. In the fashion of the Baudry diagram, we could draw the video art apparatus like I have in Fig. 6.2.

There is no need for a dotted line because the perception of the viewer travels the same route as the wires. Both types of works are loops, one presented as an object in the gallery, the other actually installed so that it can be stepped within (and frustrated

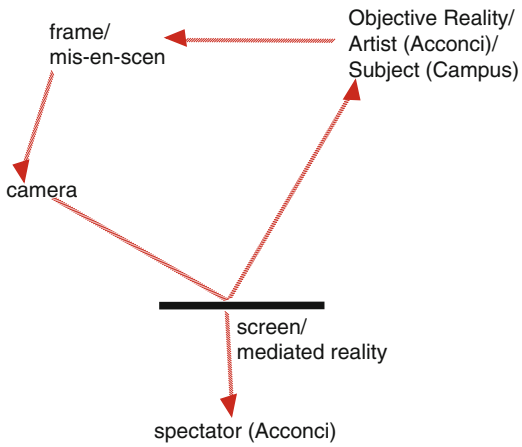

Fig. 6.2 Video art apparatus as described by Krauss

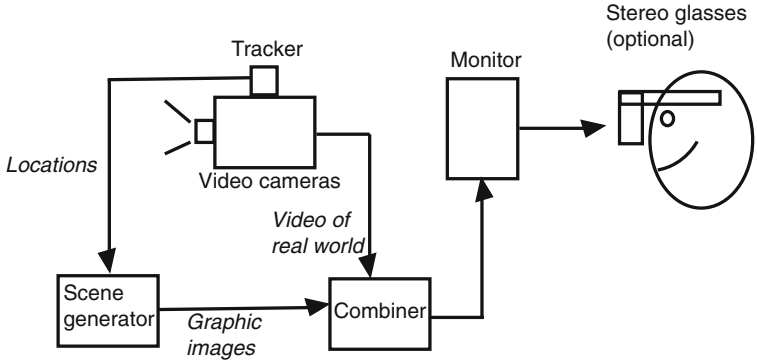

Fig. 6.3 Monitor-based AR conceptual diagram (Azuma 1997)

in the case of Campus' 'Dor'). In 'Dor', the viewer's perception should grasp equally the presence of the screen and the camera and the wire between them; this is the point. In Acconci's 'Centers', the viewer is to be aware of Acconci watching both the camera and the screen attached to it and performing within that circuit. In both works, the frame of the camera is the context of the conceptual statement—the framed square of the gallery canvas for Acconci, the frame that separates the narcissistic projection from reality for Campus. Augmented Reality uses cameras streaming live to screens in a similar way, but, as in the cinematographic apparatus, there are additions to the stream.

Ronald T. Azuma in an early 1997 survey of the Augmented Reality medium drew the diagram I have redrawn in Fig. 6.3. Missing in this diagram is the line of perception—what the spectator expects and ignores—but the similarity to Baudry's 1970 diagram of the cinema apparatus is obvious. In place of the manipulation of live objects through scripting, set design, dramatic direction, here there is a direct live stream from the camera, the 'reality' that is being augmented. In place

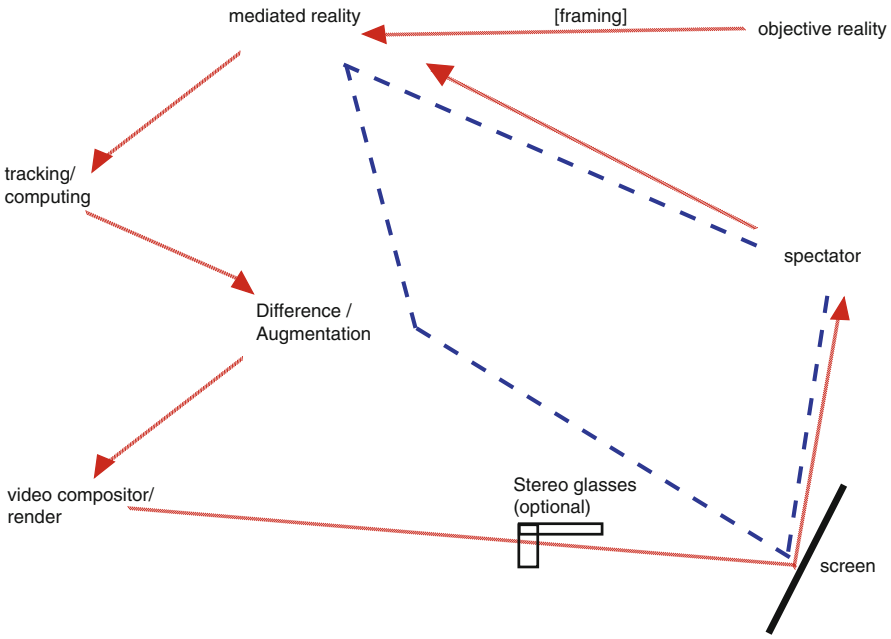

Fig. 6.4 Augmented reality apparatus (Azuma's diagram redrawn after Baudry)

of the screen there is the possibility for glasses—an invisible immersive screen that is not framed within a theater but *is* the theater enveloping the spectator. In place of montage is the 'scene generator' that creates the augmentations, those virtuals not truly present in the live video capture, and in place of the projector, a 'combiner' that renders together the augmentation and the mediated-reality of the video stream. After the style of Baudry, we could redraw Azuma's diagram like I have in Fig. 6.4. Here, again, the solid line draws the path of AR information from the objective reality captured by the live video camera, run through a tracking process, augmented with special processing and graphics, then rendered out to a screen or AR goggles (I note goggles off to the left of screen because, as described above, goggles are meant to be an 'invisible screen' that envelops the viewer). The dotted line draws the normal spectator perception. They are aware of the screen as an image not reality; they are aware of the augmentation being done—such as the addition of graphics, animations, models, or other filters on the video stream—but are largely unconscious of the actual computational processing being done to the video; any severe tracking issues such as jitter in the augmentation, or render issues such as bad aliasing would be considered a failure of the medium and would 'take us out' of the experience. Most significant is the final destination of viewer perception, a mediated reality. Unlike cinema effects, where digital computation and compositing are used to create a simulacrum of reality (real looking dinosaurs attack the real flesh-and-blood actors on the screen), Augmented Reality plays with

the combination of the evidently unreal and the real. It's essence and raison d'être is that juxtaposition and border between two epistemologically diverse universes, the live mediation and the virtual augmentation, and that border must be evident. AR doesn't attempt to embed the viewer in an objective reality, the spectator identifies with a mediation—the mediation that stands-in for reality.

The cinema screen is a window that lets on to another objective world. The AR screen is a media screen performing the tricks of which it is able: manipulation, juxtaposition, combination of live stream images and generated virtual. Augmented Reality is about combining live mediation with live computational augmentation, a medium whose essential material is not captured objective reality like cinema, but electric mediation itself. Media Art, as the media philosopher Lars Qvortrup has noted, could all be described as ready-mades where instead of R. Mutt's urinal there is now a computer, a projector, a screen, a camera (Qvortrup 2004). But AR art has complicated the ready-made; it is an art of apparatus but not of the objects themselves, instead the objects are plugged in to each other, broadcasting to each other and constantly looping in real live time. It is an art of circuits. We are no longer seeking to grapple with mediation, but have embodied it. We are, instead, grappling with our relationship to the interface and machine.

So here the question arises, what would be an avant-garde AR?

Augmented Reality art has traded off of its novelty, but as industry establishes AR experiences for commercial purposes such as Google Glass or the proposition of AR advertising flashing to our screens and glasses in department stores, AR(t) is challenged to advance the expressive potential of the electric image. Returning to our diagram, the repressed elements of computational tracking and video compositing can be mined for expressive potential. This is not, necessarily, 'glitch art'. There are multiple works, like the AR(t) collective Manifest.AR's inaugural project 'We ARe MoMA', that emphasize the synthetic nature of the compositing (Fig. 6.5). In 'We ARe MoMA', Manifest.AR virtually placed a set of 3D graphical art works in the New York MoMA without permission to be discovered through a smartphone app (similar to a myriad of other projects from the productive AR(t) collective). The juxtaposition of virtual and real was the site for the conceptual expression; this juxtaposition of compositing played with subverting real-world boundaries with virtual boundaries, in this case the real controls of private property and museum curation. Early AR(t) works used AR fiducials—barcode-like patterns used for image tracking and robot-vision. In my own project from 2009, '52CardPsycho', the spectator is allowed to interact with a deck of custom cards; in an AR 'magic mirror' screen the cards become the 52 separate shots that make up the shower scene of Hitchcock's Psycho (Fig. 6.6). The viewer is able to assemble and dissect the ancestral cinematic medium creating sculptural objects and 4D spreads of time. For spectators there was a certain fascination in the fiducial cards. The fiducial pattern itself serves to reveal the apparatus—an acknowledgment of the code which only the tracker and scene-generator can read. Fiducials are an image of the AR medium in which I can watch a computer see and interact with it while understanding that I can not read what it does. They are, perhaps, an image of our contemporary relationship with computing at large; the fiducial code reveals the obscurity of the computational

Fig. 6.5 'We AR in MoMA' (Manifest.AR 2010)

process instead of hiding it. In a 2013 work which I designed for the artist Claudia Hart, a custom app allows the viewer to see through a custom-made dinner plate—as if beneath the material as in Trompe-l'œil, the digital grotesque lying beneath the surface erotic and rotting (Fig. 6.7). In the work, titled Nue Morte, through the smartphone screen the viewer can see beneath their plate and food a languid virtual-nude covered in crawling ants. The experience toys with the representation of 3D in the two dimensional screen; the virtual is given the third dimension while the real object, a plate, is just a two dimensional screen emphasizing the particular mediated virtuality of the compositing process.

These works, like proto-cinema, are initial experiments in the medium showing that of which it is capable. But a more mature AR(t), seeking out its essential material and unique expressive potential, will grapple with making self-reflexive AR to subvert AR ideology as it forms. For me, the greatest potential seems to be in the repression of mediation in favor of a 'mediated-as-real'. In an early AR work by Canadian artist David Rokeby, 'Seen' which was installed in the Venice Biennale of Architecture 2002, four screens are connected to what seems like live cameras in the Piazza san Marco (across town) altered with temporal effects filters he designed. 'Seen', and works like it that create a sort of AR window experience, are not just effected videos; the circuit and apparatus are essential. So much so that, when unable to install a live HD connection from the piazza, Rokeby faked the connection with a pre-recorded half hour capture that was then fed through his filter; yet the description on his website remains, "The installation is made up of 4 video projections whose video material are calculated live from a single video source;" it is then parenthetically noted that the live video was not, in fact, live.

Fig. 6.6 '52card Psycho' (Rhodes 2009)

This insistence on the live nature of the circuit belies the definition of the medium: augmentation with electrical circuits and apparatus. Live mediation is the 'reality' in augmented reality. And increasingly it is our own reality. This suppression of the real in AR seems fertile ground in which to explore our contemporary relationship with networked media—our virtual presence and lives made in relationship with machines that see before we see, read our digital codes and cookies and histories that we cannot know, then compile and render out their own selections of pixels

Fig. 6.7 'Nue Morte' (Claudia Hart 2013)

and images . . . all without us seeing the process. Future AR(t) will question how to make mediation *not* seem real—to break, momentarily, the illusion of reality in mediation.

References

Azuma RT. A survey of augmented reality. Presence: teleoperators and virtual environments, vol. 6. Boston: MIT Press; 1997. p. 355–85.

Baudry JL. Ideological effects of the basic cinematographic apparatus. In: Rosen P, editor. Narrative, apparatus, ideology. New York: Columbia University Press; 1986. p. 287.

Heath S. Technology as historical and cultural form. In: Lauretis T, Heath S, editors. The cinematic apparatus. New York: St. Martin's Press; 1980. p. 1.

Krauss R. Video: the aesthetics of narcissism. Vol. 1; October. Spring, 1976. p. 50–64.

McLuhan M, Gordon WT. Understanding media: the extensions of man. Corte Madera: Gingko Press; 2003. p. 27.

Qvortrup L. Digital poetics: the poetical potentials of projection and interaction. In: Liestøl G, Morrison A, Rasmusse T, editors. Digital media revisited: theoretical and conceptual innovations in digital domains. Boston: MIT Press; 2004. p. 241.

Chapter 7
Digital Borders and the Virtual Gallery

Jacob Garbe

7.1 Introduction

This chapter develops my previous work and thoughts arising from the exhibition of augmented reality artwork (Garbe 2013), specifically in how digital mediums are in dialogue with physical space. As one enters the world of exhibition, it becomes apparent that the challenge of new media interactive artwork in general has become more and more familiar to the conversation of exhibition practice. These works have required new notions both of effective curation, as well as preservation. But while radical in many ways, for the most part these pieces still establish their interactivity within a statically delineated physical space: a gallery, an installation, or an area created through the formulation of specific environmental parameters. They break down the fourth wall of passive experience through interactivity, but still – for the most part – partake of traditional exhibition space, and leverage that to provide boundaries for acceptable behavior. In many cases they are in active dialogue with that space, and are engaging, co-opting, or subverting those spaces and their accompanying expectations. But for all this, they remain concerned with a specific physical location.

Augmented reality art, as a new media subset, distinguishes itself through its peculiar mechanics of exhibition and performative re-contextualization. It allows the artist to translocate the borders and constraints of the experience from physical to virtual, expressing the piece onto spaces in a way that is independent of physical or locative constraint, yet still tethered to the real world. This practice of anchoring virtual assets to the physical world allows artists to make use of virtual properties such as mutability and replication, while engaging with issues of embodiment, performance, and presence. In this way AR pieces show themselves as dynamic

J. Garbe (✉)
Center for Games and Playable Media, University of California Santa Cruz, Santa Cruz, CA, USA
e-mail: jgarbe@ucsc.edu; http://www.jacobgarbe.com

V. Geroimenko (ed.), *Augmented Reality Art: From an Emerging Technology to a Novel Creative Medium*, Springer Series on Cultural Computing,
DOI 10.1007/978-3-319-06203-7_7,

both in content due to their performativity, and in physical location of experience due to their mediation. This has led to the perception of AR art as being subversive or independent of curatorial practice.

However, these qualities demonstrate not so much a removal of curatorial boundaries, as a translocation of them from the physical to the digital. The art installation occurs not in the gallery, but on the hard drive of mobile devices. In this way AR artworks align themselves more perhaps with movements like net.art, where one must look to the loading screen as the gateway to the gallery, a space which – while mutable and infinitely configurable – is still proscriptive. AR may allow the artist to set many more of the work's boundaries than in more traditional media, but even that freedom is still subject to the affordances of the software composing the work.

7.2 Borders of Experience

Engagement of the fourth wall occurs when an observed artwork changes or speaks directly to the audience. Many new media interactive artworks already challenge traditional notions of the fourth wall in that the viewer's participation is an integral part of the performativity of the piece. Artworks for their part are concerned with perlocutionary acts, which is to say acts described from the vantage point of their affect on the viewer: scaring, angering, beguiling. Specifically, perlocutionary is also a useful term in describing the actions required of the piece from its viewers – and the performances the pieces in turn respond with – and how this process creates an emotional affect in the viewer. The perlocutionary qualities of such new media pieces create a feedback loop of continual engagement that is only broken when the participant has exhausted the piece's ability to perform, or the engagement offered cannot compete with their diminished attention span. Dourish explored this in his investigation of 'engaged interaction' (Dourish 2001).

But how is this different from experiencing a non-interactive piece of artwork? While a painting or sculpture may seem different to a viewer who steps closer or spends longer with the piece, the critical point is that the artwork asks nothing from them in terms of embodied action. All demands are perceptual, ones they can comfortably respond to from their position behind the passive "fourth wall". In this method too one could consider a non-interactive work conceptually complete when sitting in a gallery space unobserved. Interactive works, however, have a critical component missing that robs them of their expressive voice when they are sitting unengaged within an exhibition space.

AR complicates this even further by adding intermediary devices into the interpretive and experiential mix. Augmented reality artworks provide a way in which the fourth wall of passive viewing is enriched by, at the most basic level, technology which is appended to the senses of the viewer. The "performances" or "texts" of the piece are first mediated through a device, usually a video feed computationally modified and then displayed. This can take the form of a computer

Fig. 7.1 A gallery viewer interacts with *From Closed Rooms, Soft Whispers*, wherein printed collages are made interactive through digital projection and AR, providing an experience mediated through several screens simultaneously

with installed gallery displays, or in the case of locationally diffuse works, the more and more ubiquitous smart phone (Fig. 7.1).

The most passive level of interaction takes place purely on the level of the machine, which provides a virtual frame for the interaction, with the viewer then moving or changing the view/focus of the machine, but not interacting with the primary components. The viewing device for the user becomes a digital prosthesis which allows them to "sense" artwork in a variety of ways unapparent to the unaided senses. The work required just to experience the artwork entails a kind of performance, albeit one which is passive in the sense of changing the piece's state. Viewers are "performative observers" (Morrison 2010) who can be affected by the piece, and even be receptive to it in a perlocutionary way, but they do not affect significant change on the piece.

A good example is Camille Scherrer's *The Haunted Book* (Scherrer et al. 2008). Exhibition of this piece entails a book, a lamp modified to contain a video camera, and a computer screen. Through the experience of this piece viewers see short movies overlaid on different pages of a physical book. It is a beguiling artwork that provokes a whimsical state of interaction with the viewer – one that is focused on the aspect of hidden content revealed through the appropriate digital prosthesis.

However, we see here that while people interact with the book by turning the pages, they are not performatively engaged as co-producers of the piece. The singularity of its experience is mirrored in the singular experience of traditional artwork exhibited in a gallery or museum. Furthermore, the custom hardware necessary for its display means that this piece is tied to the place of its exhibition.

Not all augmented reality artworks are constrained through the physical embodiment of piece-specific hardware, however. One of the sub-genres of augmented artworks that takes advantage of those proclivities are locative literature pieces, such as those authored by StoryTrek software, which use smartphones as their artistic substrate.

In one such piece, entitled *Crisis 22*, viewers experience a story spatially, tied in physical location to a street in Ottawa. Viewers use a mobile device as a prosthesis for the communication of narrative, and exhibit agency in the story through an exploratory framework: re-tracing their steps reveals backstory, while heeling off into an alleyway provokes narrative digression (Greenspan 2011). In this way the piece leverages augmented reality for an artistic experience that is closely tied to a specific place with precise boundaries, yet whose borders of experience are not clearly defined to the participant. Additionally, nothing more is being asked of the participant other than the exploration of physical space to yield narrative. They change nothing in the work for others through their interactions. They have agency only as far as their own experience and interpretation of the work goes – much like a viewer of a non-interactive work in a gallery. The key point of interest in pieces like *Crisis 22* is its engaging use of specific space, which at once seems delineated, yet open to ambiguity.

Another example of such work is *Frontera de los Muertos* (Freeman 2013), an AR piece that re-contextualizes the space of the US/Mexico border in Arizona. Freeman uses augmented reality to overlay effigies of human skeletons on locations where immigrants died in the process of attempting to cross into the US. Again, it is enough with this piece that it engages in that re-contextualization, and the interactivity is restrained to perlocutionary acts of driving to the space, downloading the app, and starting up the channel in Junaio. In the sense of a curated space, the power of this piece derives directly from its location, and as such it would lose its critical context if the asset locations were moved. Therefore, while it partakes of very different parameters from traditional curation, it is still nonetheless a piece with explicit specifications.

7.3 Art Installation

Intrinsic to the unbound physical locativity unique to particular forms of AR is the concept of active perceptual re-contextualization, which is accomplished through viewer interaction. For example, in works such as Manifest.AR's gallery interventions (Veenhof and Skwarek 2010) or Phoenix Toews' sculptural app Pyrite

(Toews 2013), the artistic interface becomes invasive in its deployment. Participants are engaging the real world through a mediated context which dramatizes spaces that are otherwise mundane. This not only breaks down the "fourth wall" in terms of active participation, it also eliminates the physical boundaries in which this art is experienced. Pyrite allows viewers to create and find persistent sculptures anywhere, turning even mundane locations into opportunities for artistic display. Manifest.AR's gallery interventions allow visitors to their website the ability to submit art and have it virtually displayed in any number of galleries worldwide. Thus the performative approach that these pieces foster contextually redefines not just the conventional interactive spaces, but potentially any part of the real world.

It's tempting with focus on such work to see the medium of AR as one that's breaking down or eliminating the privileged space of the gallery in favor of more pervasive and revolutionary implementation. The interactivity which actively engages viewers both in the viewing of the piece and the expression of it through their creative action seems to break down most if not all of the gallery's proscriptions. Arguably however, the blurring of lines for exhibition space when considering AR is not so much the removal of the wall, but the translocation of it. Explanation or revelation of the experience's border parameters is always deferred, until the performative and perlocutionary components of the piece are exhausted. Only then do viewers, if they engage for an appropriate period of time, grasp the borders of what the piece can offer. In other cases the borders may be more apparent, in the affordances of where one can see the work, the degree to which manipulation or sensing of its elements is restricted by granularity of GPS sensors (for non-marker-based AR) or even short-comings of the technology itself, such as the quality of cameras and their ability to compensate for a variety of conditions.

But even setting aside these restrictions, there is still the underlying architecture, the operational logic of the piece which remains implicit, not explicit, to the viewer (Wardrip-Fruin and Mateas 2009). There is a body of computer code, one could even argue language, that is just as valenced and proscriptive as the visual language of curation in physical exhibition. But compiled programs can only be explored experientially, in a virtual manner. Thus through the lens of software development, works which in terms of physical space seem limitless and inexhaustible are actually very clearly delineated on a code level. They have acceptable, supported forms of interaction (with all the affordances those entail) even if only visible to the artist. Indeed, there's much to be said about the parallels between gallery art installation – resulting from the configuration of elements in precise manners for an intended aesthetic effect – and art software installation – the arrangement of a computational device's physical states into precise configurations for an intended aesthetic functionality. What confuses our perception of AR borders is that it is a medium seeking (or in dialogue with) embodiment. It inscribes a specific domain from the riot of virtual expressive possibilities, touching the physical world. And it asks of its audience that they engage these virtual elements in an embodied way.

7.4 Ergodic Performance

Espen Aarseth coined the term "ergodic literature" to refer to written works that require significant effort by the reader to decode in order to experience (Aarseth 1997). As touched on earlier, AR is arguably an especially ergodic artform – requiring real work from the viewers (usually in the form of technical proficiency) that can mean some succeed and others fail in grasping its embodied rules and thus exploring the piece to full expressivity. This challenge set before viewers gives rise to another layer of consideration when thinking about the performativity of AR pieces.

In non-interactive artworks there is generally one level of engagement the audience participates in. The differing layers and contexts of analysis each person brings to a piece of artwork may differentiate them when they are placed in dialogue, but for the most part the experience is a uniform level of engagement, even if there are different times and styles of attention and engagement on that level. The varying valences of content can go privately unresolved, while the only thing made public within the exhibition space is the piece of artwork itself.

For viewers of participative interactive artwork, however, interaction can change the perception of the piece for other viewers. Those who come forward to impact the work through interaction become part of the display, and their ability to tease out the performative, perlocutionary subtleties of the work can open them to critique from other viewers, giving rise to performance anxiety. This segments viewers into groups based on their willingness to interact, their willingness to perform the piece (Reeves 2005). Thus, there's an undeniably relational aesthetic element to these projects, especially since the mediation through a technological framing device demands – as a base requirement – perceptual performance from its audience. Holding the device just so, downloading this app, scanning that QR code, knowing to perform a specific sequence of actions, even outside a gallery setting, creates a Bourriaudian "state of encounter" (Bourriaud 2009). While at an installation there's a sense of being part of a group, but even in one's home or outside a physical gallery, when accessing AR there's an element of being privy to secret knowledge, a hidden virtual world, that creates a sense of being "in the know". There's a feeling of membership in a distinct group of people, accented by the very fact that AR viewers literally see the world differently than those unaware of the virtual content anchored around them.

The technical demands for artwork utilizing augmented reality are fairly high, requiring either sophisticated software making use of machine vision algorithms, or software and hardware which can make available to the creator the GPS position and heading of the viewing device. These technical hurdles were overcome for the most part first by companies seeking to monetize AR as a new media platform. As such, artists seeking to work in the medium frequently find themselves first needing to choose a software platform, which comes with its own set of constraints. It is here perhaps that most obviously one can see the restrictions and affordances which control the exhibition of AR work. Outside of licensing fees, the differences in the platforms become the differences in the artworks, much in perhaps the same way

that galleries and exhibitions coalesce into a common aesthetic sensibility. Works created in one platform may tend to focus more on marker-based AR, or perhaps more easily incorporate different forms of media as their overlay.

Furthermore, many of these platforms, such as Junaio or Layar, frequently embed their pieces as "channels" which are found through a browsing section of the app. This in turn affects the artwork, whose code is encompassed by that of the framework, by placing it in context beside other pieces. The artist may create their own context independent of the platform, but it is also very likely that a channel used for artwork is listed alongside promotions for a new movie, or an interactive ad in a magazine.

7.5 Physical as Subscriptive

This concept of "channels" is one that is used in many different digital media services, providing a way to aggregate content viewers show interest in, or want to be continually exposed to as more is authored. The interesting twist that AR potentially provides to this arises through its conflation of digital assets and physical, both of which comprise the artwork in totality.

In works that use physical artwork (such as prints or sculpture) as their AR anchors through markerless tracking – such as *From Closed Rooms, Soft Whispers* (Garbe 2013) – the digital is overlaid to provide the second part of the piece (Fig. 7.2). Prints can be distributed, and the work experienced in a variety of locations outside the gallery once the exhibition is concluded. However, exciting new capabilities arise from the fact that the digital assets for AR pieces can be stored on a server, or in project files which remain on the artist's computer. Subsequently, the AR content can be modified, remixed, or even changed wholesale at a later date by the artist, and those changes can be propagated out to the prints or physical objects owned by gallery viewers. This adds an entirely new valence to the idea of the print or reproduction as an art object, allowing it to function itself as a sort of "channel" to the artist, totemic or not, where new work can seep out from the artist's central server to affect the display and experience of their work long after the art object was acquired. This gives unprecedented control to the artist to affect work already existent in the world, but may also come with a price, in the increased ephemerality endemic to all work relying on the more transitory substrates of digital media.

7.6 Closing Thoughts

Interactive new media works challenge traditional interpretive methods in many ways – their exceptions and special cases are as variegated as the artists and mediums used in their composition. The addition of interaction complicates audience reception and segments viewers into active participants, and more passive

Fig. 7.2 A digital print from *From Closed Rooms, Soft Whispers*, which serves as an anchor for the augmented reality assets hosted on a central server

receivers of the perlocutionary actions enacted by the piece. Augmented reality artworks, situated as pieces re-contextualizing the perceptions of the viewers through intermediary devices, further show themselves as challenges – in the perception of the viewer if not in actuality – to not only the fourth wall of audience passivity, but to the borders and accepted limits of interaction. They accomplish this by translocating those borders into the more numinous virtual world, whose affordances provide a bewildering array of compelling expressions to artists. But although in content they partake of the digital, there is always an element of the physical to augmented reality artwork, something to tie it to the viewer and their embodied experience of the piece. In this way the borders are still very much so present, the affordances and proscriptions built into the very code of the work. Yet the ability to customize those boundaries, to draw one's own curatorial borders and parameters, is in itself a freedom drawing from augmented reality's strengths, inviting a model of the world as not one in which art happens, but one which is conditionally defined and experienced as an integrative work of art.

References

Aarseth EJ. Cybertext: perspectives on ergodic literature. Baltimore: Johns Hopkins University Press; 1997.

Bourriaud N. Relational aesthetics. Dijon: Leses Du Réel; 2009.

Dourish P. Where the action is: the foundations of embodied interaction. Cambridge: MIT Press; 2001.

Freeman JC. Frontera de los Muertos. https://bordermemorial.wordpress.com/ (2013). Accessed 10 Dec 2013.

Garbe J. Translocated boundaries + interview, statement, artwork. Leonardo Electron Alm. 2013;19(1):20–43.

Greenspan B. The new place of reading: locative media and the future of narrative. Digit Humanit Q. 2011;5(3):5.

Morrison A. Designing performativity for mixed reality installations. FORMakademisk. 2010;3(1):123–44.

Reeves S. Designing the spectator experience. In: Proceedings of 2005 SIGCHI conference on human factors in computing systems. New York; 2005. pp. 741–50.

Scherrer C, Pilet J, Fua P, Lepetit V. The haunted book. Proceedings of the 7th IEEE/ACM international symposium on mixed and augmented reality, Cambridge; 2008.

Toews P. Augmented mountain- pyrite. http://www.augmentedmountain.com/pyrite.html (2013). Accessed 10 Dec 2013.

Veenhof S, Skwarek M. Augmented reality art exhibition MoMA NYC (guerrilla intervention). http://www.sndrv.nl/moma (2010). Accessed 10 Dec 2013.

Wardrip-Fruin N, Mateas M. Defining operational logics. Proceedings of DiGRA- Breaking new ground: innovation in games, play, practice and theory, London; 2009.

Chapter 8
Immersive Art in Augmented Reality

Todd Margolis

8.1 Introduction

This chapter addresses the emerging trend favoring socially immersive artworks via mobile Augmented Reality over sensorially immersive AR that was based on historical Virtual Reality ideals. It will first define the various types of immersion being discussed and make distinctions in how the same term has taken on a new connotation with modern information technology. Then we'll explore socially immersive artwork by looking at both the empowering head-mounted technologies as well as some early examples using Google Glass. This will lead to a discussion on collaborative locative media by investigating enabling toolkits and tracing its roots back from Land Art of the 60s through early community-created gaming platforms to massively multiplayer online games and ultimately to the current phenomenon of collaborative "Field Art" taking place in the AR game Ingress. Then we'll conclude with a better understanding on how artists are exploring mobile Augmented Reality within an internet native culture focused on connecting people with each other through information sharing.

8.2 Definitions/Distinctions

8.2.1 Sensorial Immersion

The goal of immersion within Virtual Reality has been to surround participants with visual (and sometimes auditory, tactile or other) stimuli to evoke a sense

T. Margolis (✉)
California Institute of Telecommunications and Information Technology (Calit2),
University of California, San Diego, CA, USA
e-mail: tmargo@gmail.com; http://www.toddmargolis.net

V. Geroimenko (ed.), *Augmented Reality Art: From an Emerging Technology to a Novel Creative Medium*, Springer Series on Cultural Computing,
DOI 10.1007/978-3-319-06203-7_8,

of displacement whereby the physical world is supplanted by an alternate reality. Sensorial immersion can be applied to Augmented Reality in a manner that bases this reality on the nearby physical world, but adds virtual objects into that world. Technically speaking, Tobias Höllerer (2004) defines an AR system as "one that combines real and computer generated information in a real environment, interactively and in real-time and aligns virtual objects with physical ones" (Höllerer and Feiner 2004). This form of mobile AR has been typified in science-fiction film and literature with examples such as Princess Leia's holographic avatar, William Gibson's AR tableau of River Phoenix in Spook Country and the user interfaces in Minority Report and Iron Man, to name a few. AR interfaces would know your physical position and head orientation so that an onboard microcomputer could determine how to correctly "insert" objects into your visual perception in such a manner as to convince you that they are as real as the physical objects they are next to.

8.2.2 Social Immersion

Margolis et al. (2012) expanded upon Jonathan Steuer's (1992) definition of Virtual Reality (Steuer 1992) to describe an emerging form of Social Immersion used in mobile AR as "the social richness of a mediated environment as defined by its interactive features, that is, the way in which an environment layers networked information via real and virtual means" (Margolis et al. 2012). This form of media is not simply virtual object overlays, but of stories that connect these objects to the people and places that imbue their meaning. This new view of immersion enables us to describe participatory practices within contemporary culture that use mobile social media networking applications which give us an unprecedented ability to share information with social groups and the world instantaneously. For example, Wikitude streams information about nearby events, tweets, Wikipedia articles and user reviews into the live camera view on smart phones. Also, transmedia storytelling creates a sense of social immersion by unfolding elements of a fictional story across different platforms to create an interactive narrative over time and space.

8.3 Socially Immersive Art

8.3.1 Head Mounted AR (Wearable Smartphones)

Head Mounted Displays (HMDs) have been used as a means of displaying Virtual Reality content for decades. These systems present 3D computer graphics by placing small screens very close to the eyes. There are several devices that have come to

market over the last few years such as Epson's Moverio, NEC's Tele Scouter and the Oculus Rift which can be described using the sensorial form of immersion for AR since they overlay graphics onto the real world through see-through optics or by rendering CG over live video to opaque displays. It's important to understand these devices and the affordances they provide in order to explore what differentiates them from new platforms that are now forthcoming which are better categorized as providing social immersion for AR.

While technically the Oculus Rift is a VR HMD, given the fact that there are other vendors (Ovrvision 2014) offering camera modification attachments to enable real-time video overlays within the Rift display, it is worthwhile to compare and evaluate the Rift as a viable head mounted AR device. The latest version of the Rift dubbed Crystal Cove incorporates markers on the outside of the Rift along with an external camera that enables head tracking so that as users move their heads in the real world the virtual environment responds accordingly. This is a key feature for designing an AR system since the computer needs to know exactly where to position virtual objects on top of the live video stream as users move around. The AR-Rift (AR-Rift 2014) is also particularly interesting as it enables users to create virtual desktops within AR to create entirely new ways to work with standard applications.

As one of the most commercially successful HMD manufacturers, Oculus Rift raised ten times more than the original $250,000 Kickstarter campaign goal. It is therefore important to understand how they are focusing their business interests on the gaming sector as evidenced by hiring several of the most influential game developers such as Epic's John Carmack and EA's David DeMartini as key company strategists. This will likely make the device much more powerful and user-friendly than if it were intended primarily for scientific or military use like so many other VR headsets. It's then worth considering how game consoles have become increasingly social as they have become inherently networked. Both the PS4 and Xbox One have added built-in DVR systems to enable gameplay recording and playback as well as enabling sharing those videos to social media sites like Facebook. Perhaps even more importantly, Sony has added broadcast capabilities to the PS4 so that users can stream their live gameplay (with live picture-in-picture camera view of the player) to sites like twitch.tv and ustream.tv with the push of a button on the controller. Some of these home broadcasts reach tens of thousands of viewers and in the first 6 weeks since launch, PS4 users have already broadcast 1.7 million streams generating more than 55 million minutes while being watched by 22 million sessions (Twitch: PS4 streaming 2014). These broadcasts are accompanied by chat windows to enable discussion both within the virtual community as well as with the original player. It's then very likely that these highly established game consoles will influence the Rift and so we can consider how these emerging video sharing platforms may be integrated with a HMD like the Rift.

Google Glass on the other hand is a new device that might be best described within AR as a heads-up display (HUD) rather than a HMD like the Rift. HUDs were

originally designed starting around WW II for military use to overlay navigational information onto aircraft windshields or helmets, but are now commonplace within most gaming user interfaces to display information such as health and inventory as well as chat boxes and mini-maps to collaborate with teammates. Google Glass works in a similar way by showing various types of information in the upper-right section of your field of view. It can provide you with directions, look up facts, translate your voice or physical signage and of course help connect you with others. One of Glass's most powerful features is the ability to live-stream video from your own point of view anywhere and anytime. It's similar to a Google Hangout, but it's completely untethered. These features quite distinctly differentiate Glass from other forms of AR by creating what we can describe as Social Immersion rather than Sensorial Immersion like the Rift.

8.3.2 Socially Immersive Artworks

Google Glass art is like the new reality TV – Glass art through livestreaming ties back to artist and Internet pioneer Josh Harris and his various '90s projects like "Quiet: We Live in Public" which surrounded 100 secluded artists with webcams and broadcast their every move onto the Internet. Now Glass ups the ante by enabling completely untethered high quality directorial power to broadcast your own life or the lives of those you think the public may covet.

Helpouts (Helpouts by Google) were released in November 2013 in order to create a public marketplace for purported experts to provide real-time video chats for a fee. They are in essence an extension of Google Hangouts which have been continuously evolving to provide better quality multi-user video chat rooms with included screen sharing and embedded text chats. While the marketplace is only a couple months old, there are already thousands of advertised services listed there grouped into the following categories: Art & Music, Computers & Electronics, Cooking, Education & Careers, Fashion & Beauty, Fitness & Nutrition, Health and finally Home & Garden. The specific services being offered tend to range from pre-made lessons (e.g. over 50 people offering Helpouts to Learn to Play Guitar) to more personal problem-solving sessions (e.g. over 70 people offering Helpouts to solve peoples' Computer Issues). These live video sessions are particularly well suited for use with Glass in that many of them require the instructor to be hands free in order to help execute the Helpout.

New York artist Molly Crabapple made a drawing of porn star and circus performer Stoya while wearing a pair of hacked Glasses in a project entitled Glass Gaze (Artist gazes at porn performer 2013). The Glass enabled Crabapple to live-stream what she saw and thereby "to take the most classical, thousand-year-old way of looking: an artist looking at a model. It's the most undistracted, direct, unmediated thing. And then run it through this super-mediated, captured, commodified way of seeing that Glass represents." Crabapple reports that wearing

Fig. 8.1 First person perspective via Google Glass from an artist Katz interviewed as she created a new drawing

Google Glass while drawing made it tempting to constantly look at the image in the corner of her vision of what was being recorded. Crabapple describes the uncanny drawing process by stating "Glass is all about distraction, and it's the ultimate in unphysical – it's light on a piece of clear plastic in front of your eye."

New York city curator Samantha Katz created Gallery Glass in September 2013 as a YouTube channel (Gallery Glass – YouTube) to highlight Brooklyn artists by filming 30 artists over 30 days while wearing Google Glass (Bushwick Artist Uses 'Google Glass' 2013). Although the videos posted to YouTube are still edited and generally feel like they could have been filmed with a handheld camera, as shown in Fig. 8.1, Katz argues that Glass can give viewers a first person perspective that presents "what it's like to walk in a studio." At times Katz hands her Google Glasses over to the artists as they draw or paint, but unfortunately the videos have been edited so that the audio from the interviews are overlaid onto the visuals of the painting and drawing. While this is a standard editing technique for cinematic film, in the case here for Gallery Glass it tends to disrupt the attempt at experiencing the creation of an artwork from the artists' perspective. Katz admits the project was a "beta" test and is interested in continuing to explore the potential use of Glass for learning about art.

It could be argued that David Datuna's Viewpoint of Billions is perhaps one of the only works of art to date that is truly unique to Google Glass (David Datuna 2014). Datuna worked with mobile app developers BrickSimple to create an interactive installation that at first glance represents an American flag – see Fig. 8.2. However, as one approaches the artwork, you'll see the surface is covered with found eyeglass lenses. Beneath the lenses is a collage of photographs and newspaper clippings as well as hidden cameras and microcomputers. The cameras can record visitors as they

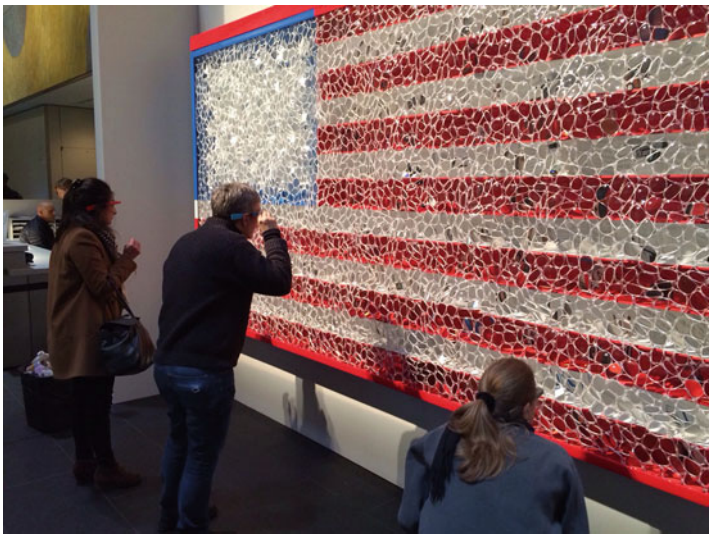

Fig. 8.2 Viewpoint of billions by New York artist David Datuna at Art Basel Miami (Datuna Glassfeed)

experience the artwork and then live stream that video back to those same visitors wearing the Google Glasses. This creates a sort of feedback mechanism in which the artwork appears to be watching you back as you watch it. While other video artists like Steina and Woody Vasulka pioneered using video feedback, Datuna's use of Glass to transmit a live video of one's self via a camera hidden directly within the artwork perhaps takes this concept to a new level.

8.4 Collaborative Locative Media

8.4.1 Handheld AR Platforms

In order to understand how mobile AR is evolving into a socially immersive medium, we will first present two exemplars of popular mobile Augmented Reality applications for smart phones and tablets. Both of these began with a traditional attempt at fulfilling the original AR goal of providing a platform for developers to create sensorially immersive AR experiences. However, they both continue to evolve to enable authors of mobile AR experiences to produce content in an increasingly more accessible manner as well as provide more and more hooks into social media platforms for quickly sharing content and experiences with friends, colleagues and collaborators.

Layar is a good example of a popular consumer mobile AR browser that allows developers to geotag a location with images, text, sound or other media (Layar). When a user is exploring the physical world through their phone or tablet, they are able to view nearby AR content overlaid on top of a real-time video feed via the device's camera. Layar enables developers to encourage end-users to easily share their AR experiences with friends on various social media platforms such as Facebook and Twitter.

Over time, Layar has changed its business model as to how to best support mobile AR technologies. They have added computer vision based scanning to their toolkit of sensing technologies. So instead of finding content solely based on your physical location, you can now point your phone or tablet's camera at an image target. Historically, AR marker targets tended to be black and white geometric patterns that resembled 2D bar charts. Nowadays, Layar and many other computer vision manufacturers use markerless targets that can be defined by any natural image as long as it adheres to a few basic technical requirements such as non-repeating patterns, no motion blur, avoiding reflections and transparencies and has generally flat illumination. This new sensing platform enabled Layar and others to support AR experiences within interior spaces where GPS satellites would not work reliably. However, from a demographics perspective, this new feature provides for countless new advertising and marketing opportunities as now companies can integrate mobile AR with their brand experience much easier.

Qualcomm's AR Software Development Kit, Vuforia, enables Android and iPhone developers to incorporate sophisticated natural image based tracking into their mobile AR applications (Qualcomm Vuforia). Vuforia also requires developers to specify an image target that users can then point their mobile phone or tablet towards to view a real-time augment. However, Vuforia also adds extended tracking to enable users to have continuous visual experiences even when the tracked target is outside of the camera view. While this might seem to be a trivial technicality, it provides for a much more seamless and immersive AR experience since now you aren't required to keep your mobile device pointed at a particular physical object, but instead one can simply use their phone or tablet to explore the entire surrounding environment as well.

It's important to understand that Layar and Vuforia have taken different approaches to mobile AR development and publishing. As an AR browser, Layar requires that end users install a single official Layar application onto their smart device. Once the user has installed this app, they have access to all of the AR "channels" that developers have published using the Layar platform. Users can either scan an image target or search through keywords and categories to find results of what AR content might exist near them. Vuforia on the other hand is meant to be packaged as a custom application for each AR experience. This means that end users must download and install a different app for every application built using Vuforia. However, it also provides developers with much more control over the application and enables apps to utilize all available Android or iPhone services and libraries to build a highly rich and engaging mobile experience.

Fig. 8.3 Spiral Jetty by Robert Smithson (1970). 1,500 ft in Utah, US

8.4.2 Handheld AR Media

These new socially based immersive media platforms provide affordances for new forms of locative artworks that were not possible before. Here we will discuss how geo-locative artworks and experiences have been emerging and where there may be precedents of artists and gamers working collaboratively within large scale environments (both physical and virtual) that perhaps have laid the cultural landscape for artists today to explore these new socially immersive AR collaborations.

In the late 1960s Joseph Beuys developed a theory of Social Sculpture that describes a society in which "Everyone is an artist". He illustrates the idea that art is meant to be participatory and can hold the power to transform society. Like Richard Wagner, Beuys strongly argued for a Gesamtkunstwerk in which society as a whole was to be regarded as one great work of art. This helped to lay the foundation for Land Art in the late '60s where the landscape and the work of art were inextricably linked as seen in Fig. 8.3 documenting Spiral Jetty. Much like contemporary AR artwork, land art was meant as a protest against the traditional museum and gallery art worlds in order to bring power back to the community.

Perhaps inspired by the well-known artists who have been transforming the landscape of our planet for the last 50 years, other lesser known artists have been transforming the landscapes of virtual environments for the last decade. Perhaps most famous of these online virtual worlds is Second Life (SL) which has had over 20 million subscribers. Many SL users pride themselves on the creative design of space and objects in SL and collaborate in groups on large-scale installations. Some of these installations mimic spaces from the real world such as in Becoming

Dragon (Cárdenas et al. 2009) while others create psychedelic art installations like StormEye (Story and Enfield 2009) out of giant moving shapes coated in video and sound. Artists build these virtual installations and then share them with other citizens of Second Life to experience.

However, this idea of locative art within a virtual world is not new to online platforms. Gamers have been designing their own levels for decades. Lode Runner from 1983 was one of the earliest games to come with a level editor that enabled level designers to create their own custom environments for playing within. The website worldofleveldesign.com is built exclusively for this community to aid sharing articles and tutorials for environment artists and level designers to help with all aspects of working on level designs and 2d/3d environments. Also, LEVEL-DESIGN.org has a reference database of tagged image screenshots to help share ideas on level design.

Now, there are countless massively multiplayer online (MMO) games where large groups of users collaborate together in teams and factions to move through the game story. In addition to solving the challenges presented by the original game designers, players often choose to create their own virtual art installations within the game world. LittleBigPlanet is an example launched in 2008 on the Playstation 3 that focused primarily on user-generated content as evidenced by their tagline "Play, Create, Share" and over 1 million user-created levels to play.

Ingress is a transmedia game by Google played out through live events, the web and mobile applications. The players' goal is to capture "portals" which are co-located with objects in the real world such as public art sculptures, landmarks and libraries. Once captured, three or more portals can be linked together to create fields that give users points. There are two factions players must choose between, the enlightened and the resistance, which battle each other to control these portals and fields. As of January 2014, over one million people are walking through cities around the planet capturing portals and linking fields.

There are no pre-defined rules on what the shape of these portal fields should look like and most of them are abstract shapes designed to maximize the amount of underlying land controlled with no consideration given to aesthetics. However, having reviewed the history of locative art in Social Sculpture, computer gaming and science fiction, we might find it inevitable that players have begun to create specific designs within these augmented reality platforms so that they link portals together in a strategic manner as to form a representational image across actual cities. This so called Field Art may connect dozens of points spanning entire cities. Given that every portal and field is in constant danger of being attacked, it is easy for one to appreciate the transient complexity of these undertakings and the need for large groups of people to help create them. We might perhaps expect to find that several Field Art installations utilize collaborations between factions to create even more complex designs. In the screenshots shown below in Fig. 8.4, you can identify the two factions contributions by looking at the two colors on the maps.

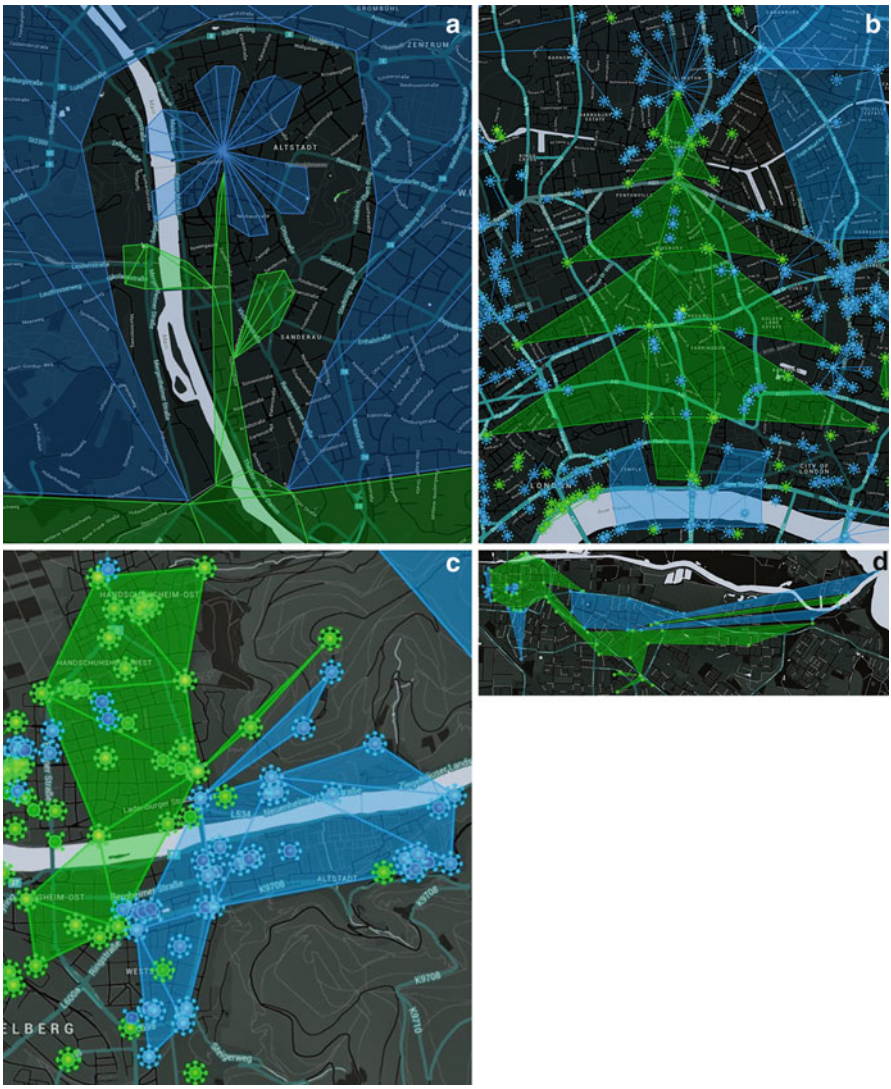

Fig. 8.4 Field art created with Ingress. (**a**) Flower in Germany. (**b**) Christmas tree in London is over two miles long (Monnington 2013). (**c**) Butterfly in Heidelberg, Germany (RNK Field Art). (**d**) Woodpecker in Germany (Stadler 2013)

In addition to aesthetic designs created within Ingress, players have used the game platform for political and social commentary. After the Boston marathon bombing, MIT Ingress players from both opposing factions agreed to a temporary ceasefire on the MIT campus as well as erected a dual owned virtual memorial for the slain MIT police officer Sean Collier.

8.5 Conclusion

We are beginning to experience mobile Augmented Reality in a new context within a culture that has come to expect (and rely upon) persistent connections between people and information. Naturally then we architect systems to better connect with each other through the Internet. These new platforms are enabling us to create new worlds that bring us together through our common interests. So whether it is learning how to paint nudes with 100 strangers via Google Glass Helpouts or touring CERN via Glass or creating virtual landscape art installations on top of and in the middle of New York City, these new socially immersive media are changing the way we can create, share and play.

Acknowledgements Eternal thanks to my beautiful wife Tracy Cornish for her love and support as well as her critical discourse in exploring Social Immersion with me. Many thanks to Alexander Nano Horn for his help reviewing and guiding this article towards clarity as well as providing wonderful examples to help contextualize some of the history of level design in gaming.

References

Cárdenas M, Head C, Margolis T, Greco K. Becoming dragon: a mixed reality durational performance in Second Life. Proc SPIE. 2009;7238:723807-723807-13.

David Datuna for Glass. http://datuna.com/. Accessed 8 May 2014.

Höllerer TH, Feiner SK. Mobile augmented reality. In: Telegeoinformatics: location-based computing and services. United Kingdom: Taylor & Francis Books Ltd; 2004. pp. 1–39.

Margolis T, Cornish T, Berry R, DeFanti TA. Immersive realities: articulating the shift from VR to mobile AR through artistic practice. In: Proceedings of SPIE, The engineering reality of virtual reality, 82890F. SPIE Digital Library, San Francisco, California; 2012.

Monnington L. tl;dr: we made a purdy tree!; 2013.

Ovrvision. http://ovrvision.com/. Accessed 8 May 2014.

Qualcomm Vuforia. https://www.vuforia.com (2010). Accessed 29 Jan 2014.

RNK Field Art. https://plus.google.com/communities/105136616454643645459 (2013). Accessed 29 Jan 2014.

Stadler M. Field art Greifswald – operation woodpecker; 2013.

Steptoe W. AR-Rift. http://willsteptoe.com/post/66968953089/ar-rift-part-1 (2013). Accessed 29 Jan 2014.

Steuer J. Defining virtual reality: dimensions determining telepresence. J Commun. 1992;42: 73–93.

Story D, Enfield D. StormEye 2009. http://slstormeye.blogspot.com/ (29 January 2014).

Chapter 9
Skin to Skin: Performing Augmented Reality

Kim Vincs, Alison Bennett, John McCormick, Jordan Beth Vincent, and Stephanie Hutchison

9.1 Introduction

Embedded throughout the work of media theorist Vilem Flusser is the observation that technologies create paradigms (Flusser 1988, 2011: 3–4). He argues that writing created linear historical consciousness, technical images such as photography created scanning, or thinking in two-dimensional planes, and, he predicted, computers would facilitate complex networked or 'structural' thinking. Flusser goes beyond Marshall McLuhan's 1964 dictum that "the medium is the message" (McLuhan 2013: 19) to assert that new media make new kinds of messages possible, because new technologies suggest and support new conceptual structures which, in turn, influence how ideas are formed and what kinds of ideas can be formed.[1]

The emergence of augmented reality then, necessitates a consideration of the new theoretical and conceptual implications this technology enables. This is not to say that augmented reality must create new ways of thinking and making. It is possible (and not always a bad thing) to simply recreate existing conceptual and artistic paradigms using a new technology. However, to fail to consider how potential conceptual and artistic shifts are made in relation to technologies such as augmented

[1]Indeed, Flusser went so far as to say that "... McLuhan ... proposes an attitude towards the image that I consider fascistoid" (Flusser 1988: 8.50).

K. Vincs (✉) • A. Bennett • J. McCormick • J.B. Vincent • S. Hutchison
Deakin Motion.Lab, School of Communication and Creative Arts, Deakin University, Melbourne, Australia
e-mail: kim.vincs@deakin.edu.au; http://www.deakin.edu.au/motionlab/index.php;
Alison.bennett@deakin.edu.au; http://www.deakin.edu.au/motionlab/;
john.mccormick@deakin.edu.au; http://www.deakin.edu.au/motionlab/;
jordanbeth1@hotmail.com; http://www.deakin.edu.au/motionlab/index.php;
Steph.hutchison@deakin.edu.au; http://www.deakin.edu.au/motionlab/

V. Geroimenko (ed.), *Augmented Reality Art: From an Emerging Technology to a Novel Creative Medium*, Springer Series on Cultural Computing,
DOI 10.1007/978-3-319-06203-7_9,

reality limits both the opportunities involved and our understanding of work that is made in these new technological spaces.

This chapter undertakes such an examination of augmented reality, using examples of recent investigation at the Deakin Motion.Lab as a way of mapping the forms in which technology has enabled conceptual shifts in both developing and finished art works. This is, of necessity, a somewhat retrospective and iterative process. We work from a practice-led perspective in which creation and conception occur together and in ways that are not necessarily immediately apparent in the process of making work. Conceptual shifts happen through the process of making, and it is only retrospectively that it is possible (and then imperfectly) to begin to synthesize the strands of thought and work in ways that create a coherent whole. We aim, in this chapter, to circle in on some of the paradigms made possible by augmented reality in creative practice through a dual analysis of the affordances, to use James Gibson's (1986: 127–128) term, we associate with augmented reality processes and of the performative paradigms we are able to enact in our artworks.

9.2 Computational and Physical Spaces: A Digital Dualism?

There was a time when the conceptual space created by computers and digital technology was limited to an elite. Personal computers emerged in the 1970s (Atkinson 2010: 80–90). The internet was opened beyond the military and academic spheres in the mid nineties (Thomas and Wyatt 1999: 683). Until quite recently, computers were something that one sat down to at a desk. There was a distinct separation between engagement and disengagement from the technology that was encapsulated in the notion of being 'online' or 'offline.'

Whilst cyberpunk author William Gibson is credited with coining and popularising the concept of cyberspace as an immersive and separate reality in the 1980s (Bell 2007: 2), since 2010, Gibson has noted the 'eversion' of the relationship between cyberspace and the physical world. Instead of sitting at a screen and disengaging from one's body into cyberspace, the digital world now overlays and engulfs the physical. Gibson's (2007) novel Spook Country created a compelling image of the digital that overlays the physical. In a 2010 interview with BBC technology correspondent Mark Ward, Gibson said "Cyberspace is colonising what we used to think of as the real world . . . I think that our grandchildren will probably regard the distinction we make between what we call the real world and what they think of as simply the world as the quaintest and most incomprehensible thing about us" (Ward 2010).

Since the introduction of internet-enabled smart phones, accelerated with the introduction of the iPhone in 2007 (Goggin 2012: 11) the distinction between digital and physical space has rapidly converged. However, at this point in time, the conceptual models used to discuss and explore this technical/cultural shift are still in the process of recalibrating. What sociologist Nathan Jurgenson describes as 'digital dualism' is the tendency to conceive of the 'digital' and 'physical' as separate and

distinct realities (Jurgenson 2009, 2011). We see digital dualism in the persistence of terms such as 'real' versus 'virtual,' which imply there is a disjuncture between the two conditions. These terms point to a lag in the cultural conceptual models we use to discuss this dynamic. Jurgenson proposes that augmented reality offers a more useful conceptual model with which to discuss and explore our contemporary relationship with digital technology. He proposes that, in addition to a technological application, augmented reality offers a useful conceptual model with which to discuss an emerging cultural paradigm (Jurgenson 2011).

Jurgenson argues that digital dualism is a faulty ontological conception that our online and offline lives are separate, and that the former is somehow inferior to the latter. As Jurgenson points out, 'online' behaviour has real-world consequences, and this can be successfully traced through political activism like the Occupy Movement. Jurgenson does not suggest that our online and offline profiles are the same (as he points out, there will always be a distinction between flesh-and-blood interactions and our engagement through new media), but rather that the barriers between online and offline behaviours have collapsed, and that we traverse multiple realities as part of a conceptual framework he refers to as Augmented Reality (Jurgenson 2012). "I am proposing an alternative view that states that our reality is both technological and organic, both digital and physical, all at once. We are not crossing in and out of separate digital and physical realities, a la The Matrix, but instead live in one reality, one that is augmented by atoms and bits" (Jurgenson 2011).

We wish to consider Jurgenson's concept of digital dualism, and in particular the argument that understanding 'real' and 'virtual' space as distinct conditions is an artefact drawn from a now outdated kind of computing experience, as elaborated by Boesel and Rey (2013), in relation to digital performance. Digital performance involves the integration of live, physical performance with digital image-creation techniques.

In dance, the advent of digital performance has generated new debate about the nature of 'virtual' dance. The concept of the virtual in dance pre-dates digital technology. Art philosopher Susanne Langer suggested 'virtual force' as the primary means of symbol-creation in dance in the 1940s (Langer 1953: 169–207). Responding to the need to re-define 'virtual' dance in the light of digital performance works, Burt (2009: 442–467) and Boucher (2011) have argued that the term 'virtual' relates to 'what might be' rather than a specifically computer-based paradigm. This thinking is expanded by Erin Manning in her concept of 'movement-as-becoming' in which 'pre-acceleration' implies the possibilities of movement that constitute a virtuality that is temporal in nature, evocative of what a movement could become in the moment of its initiation, and destroyed as soon as actual displacement of the body takes place (Manning 2009: location 67–81). In this sense, dance theory aligns with Jurgenson's position in dismantling the idea that there is a fundamental difference between the idea of virtuality in physical and digital spaces.

Digital performance provides an example of a domain in which new kinds of technically-enabled artwork generate the need to explore and examine new conceptual paradigms. Just as Auslander argued in the 1990s (Auslander 1999:

38–39) that the technological process of mediatising performance created the notion of liveness in a way that was not possible before video recording technology, digitally enhanced dance performance generated new thought regarding the notion of the 'virtual' and the need to disassociate it from a purely digital, technological definition. A new conceptual model for valuing and discussing the work was needed that could then be fed back into discussions of dance work that does not use digital augmentation technologies. It may also be that, since the 'problem of reality' has already been dealt with in live performance such as dance and theatre in response to works created using digital technology, that these practices may have a quite specific contribution to make to this debate.

However, despite the elegant synthesis of the term 'virtual' into a concept that can deal equally with physical and digital contexts, there remains a sense of anxiety about how digital technology impacts on the embodied movement experience that is fundamental to dance. What is the dramaturgy of the digital in relation to live performance? If virtuality, in Manning's sense of the incipiency of movement, can exist simultaneously in physical and digital domains, as in the case of dance performance that is augmented by digital image 'overlays', how are the sensory disjunctures between the two kinds of performance (physical body and digital image)[2] rendered meaningful?

Baugh describes the anxiety created by the introduction of pre-digital technologies into performance forms, such as dance, that are primarily focussed on embodied, movement experience. "These technologies required a considerable increase in the technical infrastructure of the theatre and a parallel development of new skills amongst the technical staff. Both of these were seen to detract from the real relationship that it was felt should properly exist between actor, audience and theatre architecture . . . The stage, increasingly filled with extravagant and extensive scenery, required so much technology and so many staff to manage the scenery, that new plays were being written to serve and exploit the technical possibilities . . . " (Baugh 2005: 180–181).

The concern about a kind of 'incompatibility' between humans and digital technology seems somewhat magnified in dance. As an art-form that has always celebrated the moving, physical body, dancers have expressed concern about the potential 'disembodiment' of the art form through the introduction of digital technology (Gunduz 2012: 309). Curiously, this fear does not seem to extend to the notion of using digital technology as a means of generating movement material, nor is it as concerning in environments where digital and biological are overlayed, with the latter retaining both physical prominence (value) and/or serving as the dominant, or driving force within the circuit.

Whether in the form of hydraulic lifts and sunken floors, lighting effects or video projection, 'theatrical deceit' is a familiar part of the repertoire of performance experience. However, the use of digital imagery such as interactive systems as integral

[2]We refer primarily here to digital images, however a similar argument can be made for digital sonification within dance performances.

Fig. 9.1 The Crack-Up, 2013

to the dramaturgy of a dance work seems more problematic. The difference here is a shift from technology serving the meaning or the narrative of a performance, as opposed to presenting a competing 'body' within the space. From the audience member's perspective, in the absence of the ability to taste, touch or smell the digital entities, both the biological and the digital are perceived visually. Both are 'real,' and both lay claim to playing an integral performative role in the work (Fig. 9.1).

Steve Dixon has described the tension this creates. "The artificiality or falsehood of the digital image has therefore limited appeal to many live artists on aesthetic, ideological and political grounds. This is particularly the case in fields such as physical theatre and body art, where the primary aim is the enactment of 'embodied authenticity', realized through the 'no smoke and mirrors' and 'no-strings-attached' material tangibility of the visceral, physical body. There is therefore a tension, even conflict, between those within performance practice and criticism at either side of the digital divide, which should not be underestimated. This has been exacerbated by the paradoxical rhetoric of disembodiment and virtual bodies, which have turned ideas of corporeal reality full circle by the claim that the digital body has equal status and authenticity to the biological one. The paradox that projected databodies and alternate identities enacted in cyberspace can be viewed as being just as, or even more vital and authentic than their quotidian referents, is now a source of belief and wonder to some and a totally unpalatable conception to others" (Dixon 2007: 24).

Underlying these divergent perspectives is a question of ontological cohesion. Observing a human performer is an experience of a different order to that of

observing digitally created images. Dixon explains the disjuncture by referring to Susan Sontag. "Taking the risk of extending Sontag's implied hierarchies of form, we would expand her idea further to argue that the sense of ritual and event is (or at least should be) far more marked in live performance than in cinema . . . Where film, video, or digital projections are used in conjunction with live performers in theatrical contexts, once the performers leave the stage, there is a marked difference in the mode of spectatorship." (Dixon 2007: 129)

For some, blending different modes of spectatorship is unproblematic, even, to take a Deleuzian view, simply to be expected (Deleuze and Guttari 1987: 9–28). For others, it appears to usurp the centrality of the (physical) body in performance, perhaps exposing an underlying anxiety about the status of the body drawn from the need to constantly re-assert the body's significance in the face of the ephemerality of performance. We suggest that these divergent views could be seen as an artefact of the change in the nature of the digital that Jurgenson suggests has left us with a concept of digital duality that pertains to a previous generation of technology.

A useful parallel for this argument is to look at the evolution of libraries. As Sarah Wanenchak (2013) has pointed out, ambivalence about the changes from mortar-and-stone buildings housing texts to digital access points assumes that there is a "single ideal type of Librariness," even as it overlooks the historical evolutions of libraries since the Middle Ages. However, the parameters we associate with twentieth century libraries are shifting. Though the 'Library' still accomplishes its purpose—namely, to share information—sharing information is no longer limited by time and space. For example, accessibility to text is not constrained by opening hours, by competing interests from other readers, or by geographical proximity to the library. The purpose of the institution has not fundamentally changed, but the physical, geographical and temporal parameters have shifted dramatically. As Wanenchak writes: "We are accustomed to books being heavy with time. On some level, it's unnerving when they aren't—or at least not in the way that we're used to . . . When we hold an ereader, we are aware—if only subconsciously—that time is not there in the same way it is with a dead tree book. It doesn't connect to all the temporally-laden ideas of Bookness that we carry around in our collective cultural memory." (Wanenchak 2013).

Wanenchak talks about books as "profoundly time-laden," within a "world that seems both temporal and violently atemporal" (Wanenchak 2013). This example is useful when we turn to the evolution of live dance, and particularly the integration of biological bodies with digital entities. As in the case with our nostalgia for a Library with its twentieth century temporal, physical and geographical limitations, the shifts towards inter-media performance throw up a number of questions. However, while you could argue that a text read digitally or the old-fashioned way fundamentally offers the same information-sharing properties, removing dance from its embodied performative state alters the nature of the art form. Like reading a book, watching a dance performance is a time-laden activity. Even durational performances (such as Einstein on the Beach) where audience members are invited to exit and enter the theatre at their own volition, create structures within a geographical space.

Something similar occurs when physical and digital 'bodies' coincide in performance. One is confronted with the 'old' notion of the performing physical body, alongside the 'new' digitized version of that body. Definitions of both drawn from a now out-dated dualistic view of the physical and digital must be sifted through and responded to in the moment of watching such a performance.

9.3 Augmented Reality Performance

The concept of augmented reality acts as a point of disjuncture in this discussion. Augmented reality is usually thought of in terms of a particular technology that recognises images in the physical world, which then trigger image overlays to be projected as if co-existing with the scene the observer is viewing. However, in this discussion, we wish to broaden this idea to consider the concept of visually overlaying the physical and digital regardless of the technology used, in order to begin to map how augmented reality artwork both informs and is made possible by this concept. To do this, we discuss three digital performance works created at the Deakin Motion.Lab.

The first work, *Shifting Skin*,[3] created by Alison Bennett, provides a performative, embodied encounter with a series of photographs created using a flatbed scanner to create images of skin, and specifically of skin with scars and tattoos (Bennett 2013). When viewers observe a series of photographic prints through an iPad, an augmented reality overlay appears, generating depth in relation to the colours in the image. As Fig. 9.2 demonstrates, the work creates an augmented reality overlay of screen based content with fine art print. The print and screen based content presents alternatively flattened and expanded skin as a metaphor for surface. The augmented reality creates the illusion that the virtual content projects out of the print, and that they are directly spatially connected, for indeed they are, conceptually. The 3D topology is an inversion of the surface data captured in the scans. The experience of viewing *Shifting Skin* is performative in the sense that observers are able to move in relation to the image and the iPad to obtain different views. The work generates a sense of physical play that may have seemed at odds with the digital and web-based nature of the digital overlay. Internet content can potentially be omnipresent, in any place. However, when applied in an augmented reality context, it becomes tied to a specific place. This was a locative use of internet application in a field in which content is normally widely disseminated, and one that juxtaposes physical and digital worlds in a way that is performatively created by the viewers' physical actions.

The second work is an element within an evening-length work currently in development called *The Crack Up*[4] (see Fig. 9.1). This scene, created by John

[3] *Shifting Skin* opened at the Deakin University Art Gallery, 24 July–31 August.

[4] *The Crack Up* will premiere in Melbourne in October 2014.

Fig. 9.2 Untitled (camera) from the series '*Shifting Skin*' 2013 by Alison Bennett

McCormick, Alison Bennett, Kim Vincs and Steph Hutchison, uses images from *Shifting Skin* as a basis for a different kind of physical/digital juxtaposition. In this case, movement data from the Kinect is used to drive a depth map generated from the photographic image using real-time data from a dance performer (see Fig. 9.3), via a custom interface created by McCormick using the Unity game engine. This process generates large spikes, which, since the image is projected behind the dancer in stereoscopic (3D) mode, appear to rise out of the image like a bizarre collection of brightly coloured, needle-sharp spikes. The audience sees a dancer in dialogue with her own movement data, transformed into a kind of 'figure' formed from the spikes rising dynamically from the image. This work focuses on creating digital and physical overlays in the context of a live dance performance. As in *Shifting Skin*, the human form seems to arise out of the image of tattooed skin. However, in this case, the form is not supplied by data sent from a remote server, but is generated by the real-time movement of the performer. One effectively sees three 'performers'; Hutchison as physical presence, a digital humanoid form created using depth mapping based on Hutchison's movement data, and a digital 'skin' that moves across the dynamic topography of the spikes.

The third work is *Recognition*,[5] created by John McCormick and performed by Steph Hutchison. This work, for us, most fully encompasses Jurgenson's definition

[5] *Recognition* was first shown at the Frankston Arts Centre, 4–28 September 2013 http://artscentre.frankston.vic.gov.au/Arts_To_See_Do/Exhibitions/Past_Exhibitions/John_McCormick

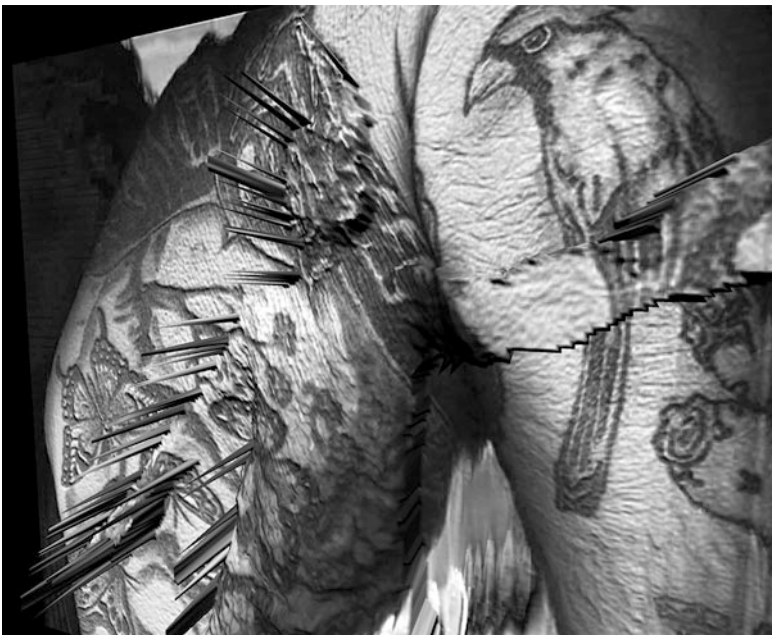

Fig. 9.3 'Spikey Guy' (The Crack-Up) 2013 by John McCormick, Alison Bennett, Steph Hutchison and Kim Vincs

of augmented reality as the embeddedness between the digital and the physical. In this work, a series of spheres move, again in 3D stereoscopic space, in response to motion capture data from a performer, again via a scene in Unity game engine created by McCormick. The spheres are wrapped in an image of the iris of one of the creator's eyes, as a way of embedding the physicality of the performer's physical body within the digitally generated aspects of the work. The movement of the spheres follows the performer's limbs, and is mirrored to create a symmetrical yet highly readable rendition of the movement (see Fig. 9.4). In this work, however, the digital imagery can be driven either in real-time by a performer, or by an artificial intelligence choreographic agent developed by McCormick (McCormick et al. 2013). The agent, constructed using a self-organising map (Kohonen 1989) 'learns' from motion capture data input and is able to perform a rendition based on known movement phrases. The agent was given input from Hutchison's movement data, and therefore has a dance vocabulary derived from her movement. This system created a more detailed and complex integration of physical and digital elements since the machine-based system, in this instance, shares not only a visual projected space with a human performer, but also shares a movement vocabulary which is not simply imposed upon the software, but which the software actively learns and reproduces in its own fashion.

This integration of digital and physical represents, for us, a high-water mark in a series of artworks that consider augmented reality as a conceptual model

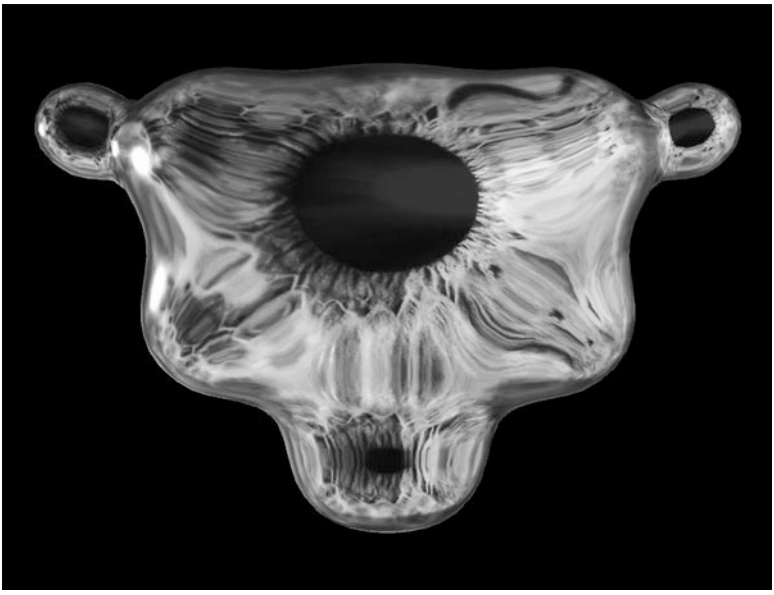

Fig. 9.4 'Recognition' 2013 by John McCormick

rather than simply a specific form of technology. Augmented reality is widely accepted as a technology based on recognition of specific images, which trigger pre-defined digital imagery. However, this definition only explains one part of the works. *Shifting Skin*, with its performative integration of viewers through the need to physically position and re-position the iPad in relation to the photographs, and its integration of the notion of skin through the images themselves and the movement of those images over an expanded, stretched and distorted topology, embeds the physicality of skin and scarring across physical and digital domains. *The Crack Up* integrates real-time physical performance with the 'performance' of a digital 'skin' that also references, through generating needle-like spikes projected out of the screen in 3D, the origin of the tattoo images. *Recognition* takes these elements and embeds an AI performer, trained by motion capture data from a human dancer, within this scenario so that the digital system performs in a very real sense alongside and in dialogue with a human performer.

9.4 Location Is Everything

Digital entities in performance demand a kind of "collective hallucination," to borrow William Gibson's fictional description of a system that enables direct interface between mind and data (Rey 2012). Physical and digital 'dancers' must be simultaneously perceived as part of conceptual whole. Moreover, digital dance

performances evoke a kind of hallucination that is predominantly visual to the audience, but invisible to the biological body (the dancer) who is inhabiting that shared space. Without perspective and glasses, the dancer is present physically, temporally and geographically—but she is fundamentally disengaged from the primary entry point to the "hallucination"—what can be seen.

More recently, Gibson has argued against digital dualism and in favour of a "reality where atoms and bits interact and continuously influence one another" (Rey 2012). The crux of Gibson's 'blended' reality, of Jurgenson's Augmented Reality and even of our anecdotal engagement with digital devices, is the increasing shift to a user-led experience. This goes back to the example of 'Librariness' as discussed by Wanenchak; namely that the evolution to a digital repository no longer necessitates a physical space, nor one that is limited by time of day, our physical proximity to the building, or the availability of material.

What is intriguing, however, when we turn to intermedia dance performance, is that the theatrical environment is, traditionally and fundamentally, not a user-led environment. Theatrical experience demands what Coleridge famously referred to as the 'suspension of disbelief,' and to allow the action to unfold in front of us. The notion of the staged action as 'real' is crucial to an appreciation of the art-form, but the structures that make for great theatre are often incompatible with a user-led experience. Artworks that allow for users to engage with a certain interface are increasingly available, but even these are often constructed within strict parameters. You may, for example, be able to interact with a digital entity, and therefore become part of a kind of circuit of movement and influence, but even that experience may need to be controlled in terms of physical proximity, geography, and of course, temporality. More often than not, artists such as Klaus Obermaier, Gideon Obarzanek and Anarchy Dance Theatre present a circuit between biological and digital bodies, which is then perceived, from the outside, by audience members. The elements and guiding principles of that individual circuit may be transparent or opaque.

The theatre has a long history of creating disjuncture in perspective between performers and audience. Speaking of renaissance theatre, Baugh argues that "(h)istorically, theatre technologies have come to represent powerful divisions between artists and their audience—the proscenium arch and the enclosed secrecy of the stage house clearly reflect this division" (Baugh 2005: 200).

A similar division is enacted in digital performance in which a dancer 'drives' an interactive system. In this situation, is there a fundamental difference between the dancer's interaction between recorded media (e.g. video or still image projection) and interactive media that respond in real-time to the dancer's actions? The situation could be likened to watching an avid gamer simultaneously play a MMORPG on one screen and watch a TV series, streaming on another screen. Both are streamed, online experiences, yet engagement within a MMORG might be deemed more immersive, since it responds to the player in real time, whereas TV, be it delivered by radio transmission, cable or internet, might be deemed less physically engaging since it does not respond to the veiwer's actions. Perhaps immersion for the player is enhanced by 'active' participation, the engagement of multiple senses, touch and

proprioception added to the visual through the use of controllers to interact with the online scenario. TV is more 'passive', the player/viewer affording attention to the TV screen, yet with no discernable physical interaction.

However, the perspective of the spectator watching yields a different impression. From the perspective of the spectator, watching the player, the two screens seem to carry similar weights. The player's active participation in the 'virtual' environment yields a greater range of physical artifacts that state clearly their participation in the present moment in the real, perhaps more so than the moments of stillness attending to the TV show. However, the change of perspective from player to spectator watching the player in their environment, affords a different view of the relationship between the physical and digital environments. The spectator sees the player in their environment as a single event, attention shifting from online game, subliminally or overtly to the TV show, a glance to any pending online notifications, a momentary check on the status of coffee level, then back to the game. The spectator or friend may in turn be predominantly concerned with the TV show, passively interested in the skill and conquests of the player, and closer to the source of coffee if replenishment is required. All are components of the real; physical, cerebral, digital.

The distinction between these two perspectives turns on the association of the virtual with the immersive. The concept of 'virtual reality,' which pre-dates augmented reality, is tied up with the concept of immersion. The virtual aspires to become the real through providing a truly immersive experience in sensory, perceptual, cognitive and affectual terms. Triggering, in the sense that a player/performer's actions cause an outcome, is a causality symptomatic of tangible interactions. Watching the player physically interacting with the game through a physical controller binds their physical actions to the digital environment. While this may be interpreted to add to the immersion of the player within the digital environment and remove them from the 'real' in favour of the 'virtual', from the friend/spectators perspective, the concentration and physical intensity of the player is palpable and serves to make them no less present to the spectator. The interactions (triggering) enable the spectator to see further how the player is interacting within the game and how the player's physicality and the digital environment are bonded together. Our dancer shows similar symptoms, direct causal behaviour illustrating how the dancer and the digital environment are enmeshed together.

The spectator perspective is the one given to audience members in digital dance performance. The audience is privy to the dancer operating within their environment, inclusive of digital layers, and is able to construct meaning constituted from all the available elements. The dancer may have their own internalised view of the environment, however it is the audience member who is in a position to evaluate the elements as a single reality, not as completely separate physical and digital experiences. Digital performances such as *The Crack Up* and *Recognition* evoke augmented reality experiences from the audiences' perspective, but not necessarily from the performers'. This is potentially one of the reasons that digital performance evokes such varied responses from dance artists themselves. The embodied experience that is fundamental to dance practice is normally understood

first from within the dancer's own body and then shared with others through performance. Augmented reality, in the sense that we describe it here as a means of integrating physical and digital experiences, reverses this premise since the full experience is only available to the audience. *Shifting Skin* effects an even more complex transaction by conflating the roles of performer and viewer in a scenario in which viewers, in effect, physically perform the experience of viewing the work for each other.

Augmented reality experiences lie in the eye and, perhaps more importantly, the location of the viewer. Augmented reality is not an attempt to create an immersive experience, but precisely the opposite—a means of activating, simultaneously, multiple threads of experience across physical and digital domains. Augmented reality in the context of digital dance performance is generated from technologies that enable the sharing of embodied experience beyond the limits of the physical presence of a performer. We see this as one of the key enabling paradigms augmented reality technologies offers digital artists. A consequence of this affordance, however, is that embodied experience, whether it is the phenomenological awareness of skin with all it entails; boundary, surface, implied volume, transgression, marking, piercing, scarring, embellishing, and/or the not unrelated awareness of physical movement; surface, volume, mass, gravity, speed, dynamic, physics, affect, contact, agency, can be simultaneously digital and physical.

Augmented reality is often understood as a digital overlay on a physically 'real' world. While this might describe the logistics of the technology with some accuracy, the conceptual affordances of augmented reality technology make possible artworks that do not position digital and physical worlds in an hierarchical relationship, but foreground the inevitable integration of multiple sources of experience. Artworks such as we have described, which articulate this integration via technologies that embed human movement and, more specifically, dance performance within an augmented reality framework, provide a demonstration of the inability of digital dualism to stand up even in relation to what might be considered the most unlikely candidate for digital distribution – the embodied experience of the human body.

Acknowledgements This research was supported under Australian Research Council's *Discovery Projects* funding scheme (project number DP120101695), and by the Deakin Motion.Lab and the Centre for Intelligent Systems Research, Deakin University, Melbourne, Australia.

References

Atkinson P. Computer. London: Reaktion; 2010.
Auslander P. Liveness; performance in a mediatized culture. Abingdon: Routledge; 1999.
Baugh C. Theatre, performance and technology. New York: Palgrave Macmillan; 2005.
Bell D. Why cyberculture? In: London and cyberculture theorists: Manuel Castells and Donna Haraway. London/New York: Routledge; 2007. p. 1–14.
Bennett A. Shifting skin. AR[t]. 2013;4:26–31.

Boesel W, Rey P. A genealogy of augmented reality: from design to social theory (Part One). Cyborgology. http://thesocietypages.org/cyborgology/2013/01/28/a-genealogy-of-augmented-reality-from-design-to-social-theory-part-one/ (2013). Accessed 14 Dec 2013.

Boucher M. Virtual dance and motion-capture. Contemp Aesthet. 2011;9. http://www.contempaesthetics.org/newvolume/pages/journal.php?volume=45.

Burt R. History, memory, and the virtual in current European dance. Dance Chron. 2009;32(3):442–67.

Deleuze G, Guttari F. A thousand plateaus: capitalism and schizophrenia. Minneapolis/London: University of Minnesota Press; 1987.

Dixon S. Digital performance: a history of new media in theatre, dance, performance art and installation. Cambridge, MA: MIT Press; 2007.

Flusser V. On writing, complexity and the technical revolutions: video of interview in OsnaBruck. Eur Media Art Festiv. 1988. http://youtu.be/lyfOcAAcoH8.

Gibson J. The ecological approach to visual perception. New York: Psychology Press; 1986.

Gibson, W. Spook Country. New York: G.P. Putnam's Sons; 2007.

Goggin G. The iPhone and communication. In: Hjorth L et al., editors. Studying mobile media: cultural technologies, mobile communication, and the iPhone. New York: Routlegde; 2012.

Gunduz Z. Digital dance: encounters between media technologies and the dancing bodies. In: Riha D, editor. Frontiers of cyberspace. Amsterdam/New York: Rodopi; 2012. p. 309–33.

Jurgenson N. Towards theorizing an augmented reality. Sociology Lens, The Society Pages. Wiley-Blackwell. http://thesocietypages.org/sociologylens/2009/10/05/towards-theorizing-an-augmented-reality/ (2009). Accessed 15 Dec 2013.

Jurgenson N. Digital dualism versus augmented reality. Cyborgology. http://thesocietypages.org/cyborgology/2011/02/24/digital-dualism-versus-augmented-reality/ (2011). Accessed 15 Dec 2013.

Jurgenson N. When atoms meet bits: social media, the mobile web and augmented revolution. Future Internet. 2012;4(1):83–91. doi:10.3390/fi4010083. Accessed 16 Nov 2013.

Kohonen T. Self-organization and associative memory. 3rd ed. Berlin/New York: Springer; 1989.

Langer SK. Feeling and form: a theory of art developed from Philosophy in a new key. London: Routledge & Kegan Paul; 1953.

Manning E. Relationscapes: movement, art, philosophy. Cambridge, MA: MIT Press; 2009. Kindle edition.

McCormick J, Vincs K, Nahavandi S, Creighton D. Learning to dance with a human. Proceedings of the 19th international symposium of electronic art, ISEA 2013, Sydney; 2013. http://hdl.handle.net/2123/9638. Accessed 14 Dec 2013.

McLuhan M. Understanding media: the extensions of man, e-book. New York: Ginko Press; 2013.

Rey P. The myth of cyberspace. The New Inquiry. http://thenewinquiry.com/essays/the-myth-of-cyberspace/ (2012). Accessed 12 Nov 2013.

Thomas G, Wyatt S. Shaping cyberspace – interpreting and transforming the Internet. Res Policy. 1999;28(7):681–98. doi:10.1016/S0048-7333(99)00016-5.

Wanenchak S. All libraries are 'Real'. Cyborgology. http://thesocietypages.org/cyborgology/2013/10/04/all-libraries-are-real/ (2013). Accessed 12 Nov 2013.

Ward M. William Gibson says the future is right here, right now. BBC News 12 Oct 2010. http://www.bbc.co.uk/news/technology-11502715 (2010). Accessed 14 Dec 2013.

Chapter 10
Augmented Reality Painting and Sculpture: From Experimental Artworks to Art for Sale

Vladimir Geroimenko

10.1 Introduction

The terms "Augmented Reality Painting" and "Augmented Reality Sculpture" can refer to a diverse variety of artworks. Because the digital allows the artist to go beyond the boundaries of traditional media, many of those artworks can be more related to computer games and other types of interactive installations than to painting and sculpture in their traditional sense.

This chapter will focus on use of Augmented Reality that is as closely related to traditional painting and sculpture as possible. In the wide spectrum of possible AR artworks, this area seems to be especially important, because it is rooted in the history of painting and sculpture as part of a universal human culture. In this context, novel game-like paintings and sculptures seem to be the continuation of a recent computer game history rather than thousands of years of traditional art. How can augmented reality enhance and extend traditional art without turning a painting into something completely different such as, for example, an interactive movie? Can augmented reality painting and sculpture inherit one of the most distinctive features of traditional art – incredible saleability of its pieces?

At present, Google Scholar provides just a few results for a search on "Augmented Reality Painting" and none for "Augmented Reality Sculpture" (Google Scholar 2013). One of the oldest research papers is entitled "Augmented Reality Painting and Collage: Evaluating Tangible Interaction in a Field Study", and describes an AR environment for painting, with a physical brush, digital textures on physical models, and creating dynamic stages for the model with spatial collages providing different backgrounds (Jacucci et al. 2005). It deals with the evaluation

V. Geroimenko (✉)
School of Art and Media, Plymouth University, Plymouth, Devon, UK
e-mail: vgeroimenko@plymouth.ac.uk; vlad@geroimenko.com;
http://www.plymouth.ac.uk/staff/vgeroimenko; http://www.geroimenko.com

V. Geroimenko (ed.), *Augmented Reality Art: From an Emerging Technology to a Novel Creative Medium*, Springer Series on Cultural Computing,
DOI 10.1007/978-3-319-06203-7_10,

of a particular form of augmented reality in order to demonstrate the benefits of specific features of the environment and of its tangible interfaces. One of the latest works presents a tool for creating 3D photo collages using mobile augmented reality, in which virtual pieces are textured with pictures taken with the camera and can be blended with real objects to create interesting works of art (Marzo and Ardaiz 2013).

Currently, some artists praise augmented reality painting and sculpture as the future of these art forms, but they are doing this on their websites and blogs rather than in academic papers (though with some excellent and convincing examples of their AR artworks). The blog entry "The Future of Painting?" by Jones Trevor (Trevor 2013) and the webpage and video "Between Physical and Digital: Augmented Reality Sculpture – 2013" by Ian Hutchinson (Hutchinson 2013) are particularly worthy of note.

Among a variety of AR paintings and sculptures, the most common are the techniques of replacing a painting with an animated video that brings its content to life (see, for example, Baradaran 2011; Trevor 2013), and the 3D mapping projection on real-world sculptures or buildings (for some examples of Projective Augmented Reality, see Valbuena 2007; Roberto and Teichrieb 2012). Many examples of different types of AR sculpture can be found in other chapters of this book.

10.2 Augmented Reality Painting

In this chapter, a particular type of augmented reality artworks will be considered that is close to (or is based on) a traditional understanding of painting. We will refer to this type as "Augmented Reality Paintings" in more general terms, because augmented reality is in its very essence and also because the use of the term is consistent with the name for a similar type of books that are called "Augmented Reality Books" (see: Amazon 2013). An augmented reality painting comprises two parts: a conventional physical painting (such as an art print, or an oil or acrylic original painting) and an AR-based digital component that is integrated with the physical painting in such a way that only experiencing the both parts at the same time with an AR-enabled device makes the entire painting complete and meaningful.

To test this concept of Augmented Reality Painting, six experimental artworks were created. They were also intended to explore and exhibit some possible diversity of this novel type of painting in terms of both its content and form. As a result, paintings 1–4 used flat images with transparent backgrounds as their augments, which were visible using the Layar application. Paintings 5 and 6 were augmented with 3D objects, floated in the air in front of them, that could be experienced with the Junaio AR browser. In both cases, a person just had to scan the physical part of a painting with their iPhone, iPad or Android phone in order to see the entire artwork.

These six Augmented Reality Paintings constituted a solo exhibition *Hidden Realities* that took place in the Scott Building's Foyer Space at Plymouth University (UK) from 8 to 19 April 2013 (see Fig. 10.1). All the paintings were gallery-quality framed A3+ art prints of original digital paintings, produced by the author.

Fig. 10.1 *The Half Kiss* by Vladimir Geroimenko, 2013. An augmented reality painting at the *Hidden Realities* Exhibition

The following labels, placed on the wall near the paintings, included the title of a painting and a concise description of its main idea:

- Painting 1: "What Lies Underneath?" An Impressionist-style digital photo painting of the Link Café at the Eden Project, Cornwall. This artwork is a tribute to the Black and White Photography that was an historic starting point for today's Digital Photo Painting.
- Painting 2: "The Half Kiss." A digital photo painting that brings up a question "Who is that girl kissing?" Augmented Reality provides the answer (see Figs. 10.1 and 10.2).
- Painting 3: "This is not a Phone." A digital photo painting with a reference to René Magritte's "This is not a Pipe". Is the iPhone really a phone or is it something else? Look at the painting through the AR browser of your smart phone (see Figs. 10.3 and 10.4).
- Painting 4: "Augmented Quote." A digital photo painting that shows only the first part of a quotation. An Augmented Reality feature completes the quote, makes it funny and adds the name of the author.
- Painting 5: "Four Keywords Lost in Augmented Reality." A digital photo painting based on a constructed virtual environment. Where is the fourth key? Only your AR browser can find it.

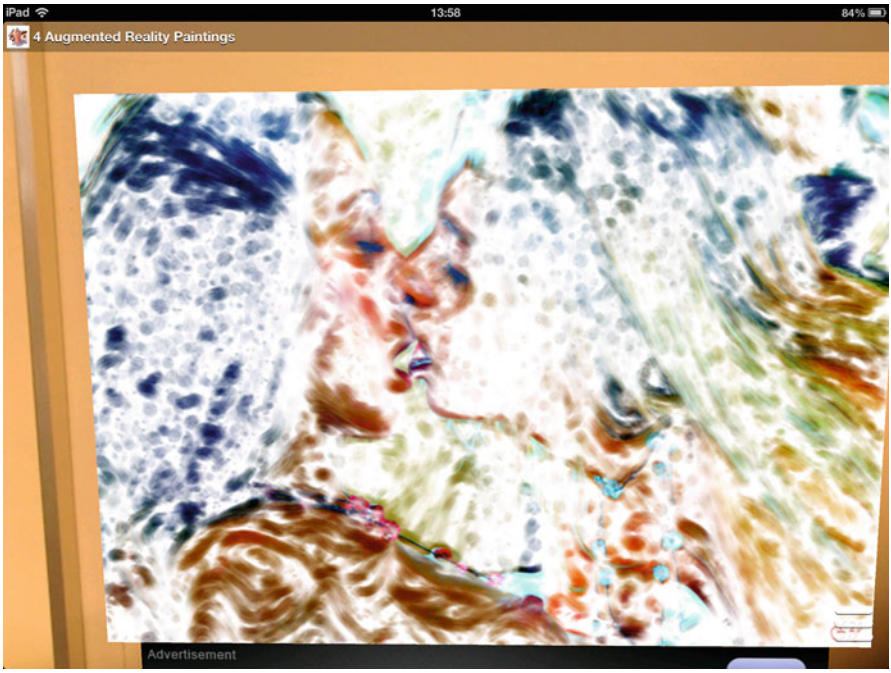

Fig. 10.2 An AR view of the complete painting *The Half Kiss* (iPad screenshot by Vladimir Geroimenko)

- Painting 6: "The Hand of Moscow." A digital photo painting of Moscow's Red Square with a humorous AR parody on an infamous cold war cliché. Beware the invisible hand! (see Figs. 10.5 and 10.6).

The above creative production has revealed that in response to the question "What would make a good augmented reality painting *per se*?", the closest answer would be "Integration, integration, integration!" Creative integration of physical and digital is paramount for producing "a whole picture" – augmented reality paintings are about the integration of physical and digital worlds to produce a coherent whole. Consequently, painting, constructing and putting together augmented reality artworks is a new and exciting area of creative practice.

The physical part of an augmented reality artwork can, in principle, be a painting of any kind and technique, ranging from a specially produced one to an existing masterpiece, such as a Van Gogh. It's worth mentioning, for example, a research project in which visual AR-based information (e.g. the X-ray capture and the back of the painting) has been laid over the original of such a masterpiece (Van Eck and Kolstee 2012).

Having a deep respect for oil, acrylic and other traditional painting, we nevertheless consider digital painting and particularly Digital Photo Painting (Geroimenko 2011) as the most suitable for the implementation of painted AR artworks. Digital

Fig. 10.3 *This is not a Phone* by Vladimir Geroimenko, 2013. An augmented reality painting at the *Hidden Realities* Exhibition

paintings can easily be constructed and then painted in such a way as to that allow the best possible integration between their visible parts and their hidden augmentations, because at the moment of their creation by an artist both parts are digital. The visible part can then be materialised as a printed artwork in order to be exhibited and/or to be sold. Usually, it would be a limited edition high-quality Giclée print that can last up to 100 years, and is individually signed and numbered by the artist.

10.3 Augmented Reality Sculpture

The precise definition of augmented reality sculpture is difficult, because, on the one hand, there is a wide diversity of AR-based sculptural artworks, and, on the other hand, not every three-dimensional AR object can be considered as a sculpture.

A basic classification of the main types of augmented reality sculpture could be for the time being as follows (other types will definitely come up in the future):

- Projected AR sculptures – 3D mapping of 2D digital textures on real-world sculptures, buildings and other physical objects.

Fig. 10.4 An AR view of the painting *This is not a Phone* that reveals the hidden nature of iPhone (iPad screenshot by Vladimir Geroimenko)

- Hybrid AR sculptures that consist of two parts (physical and digital; both of them are 3-dimensional), which produce a sculpture as a comprehensible whole.
- (Genuine) AR sculptures that are completely digital and have no physical part.

Many augmented reality artworks can include digital 3D objects in a variety of sizes. Some of them can be considered as sculptures. Which ones? This depends mostly on the artist's intention and the artistic perception of the viewer.

As comprehensively shown in the other chapters of this book, augmented reality sculpture can be implemented in a wide variety of forms. These possible implementations can be represented as a spectrum. At one end are augmented reality artworks that visually are very similar to traditional sculptures, but implemented as digital 3D objects. The opposite end of the spectrum has an unlimited diversity of possible implementations that include highly interactive and animated game-like AR sculptures based on the latest relevant technologies.

In this chapter, we focus only on the "traditional" end of the spectrum, because it seems to be of a significant importance for the following reason: AR sculptures that look like traditional ones (either classic or modern) are deeply rooted in the history of art and have a more or less clear conceptual and cultural connection to their predecessors. AR sculptures of the "technological" end of the spectrum, on the

Fig. 10.5 *The Hand of Moscow* by Vladimir Geroimenko, 2013. An augmented reality painting at the *Hidden Realities* Exhibition

other hand, can mostly be perceived by the viewer as interesting installations that are related to computer games rather than to conventional sculptures.

The following experimental work by the author can serve as an example of this kind of augmented reality sculpture.

The Enterprise Jigsaw was a sculptural artwork dedicated to a mission of the University of Plymouth as *the* Enterprise University. The sculpture has been exhibited in the City Jigsaw Garden in Plymouth, UK since 24 March 2011. The augmented reality installation consists of a three-dimensional digital sculpture 'erected' nearby the main campus, in front of the university's flagship building and right in the middle of the Jigsaw Garden (see Fig. 10.7).

Viewing of the artwork requires the Layar Reality Browser to be installed. The viewer can easily perceive that the augmented reality sculpture is *really* placed in the real world environment – in the middle of the Garden. To be convinced of this, they should follow the pavement around the Garden looking at the sculpture from all possible viewpoints.

As such, the digital sculpture *The Enterprise Jigsaw* is a 3D augmented reality object, consisting of 11 jigsaw puzzle pieces that form a word that uses jigsaw-style fonts and reads *Enterprise* (see Fig. 10.8).

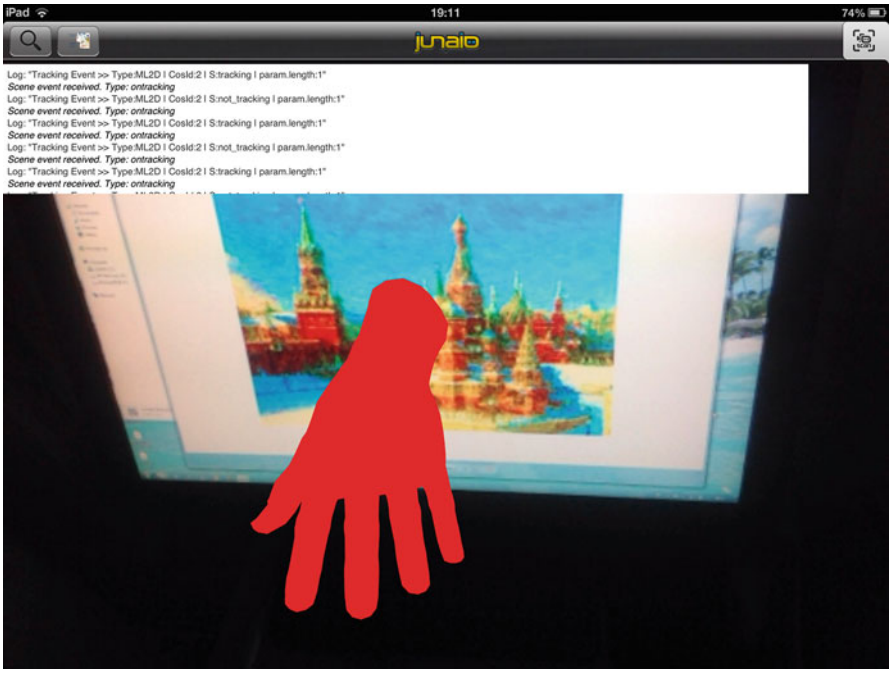

Fig. 10.6 An AR view of the painting that shows a hidden red hand of Moscow (iPad screenshot by Vladimir Geroimenko)

This augmented reality installation bears several symbolic meanings. It represents the developing enterprise relationships not only between the University and the City of Plymouth, but also between the real and digital worlds. The University of Plymouth (now renamed to Plymouth University), *the* Enterprise University, is the key piece in the regional 'enterprise jigsaw' with its 'commitment to driving social inclusion, economic prosperity, and environmental quality in our local community and beyond'. This sculptural artwork combines the artist's personal attitude towards enterprise with the strategic mission of Plymouth University. The enterprise is a puzzle, an adventure. Putting the jigsaw pieces of an enterprise project together is both challenging and fun.

10.4 The Saleability of Augmented Reality Artworks

One of the main problems that Augmented Reality Art is facing on its way to become a "legitimate" form of art is to make AR artworks saleable. This, for example, was clearly stated by Lanfranco Aceti in his Editorial to the LEA double issue on Augmented Reality Art: "Problems though remain for the continued success of

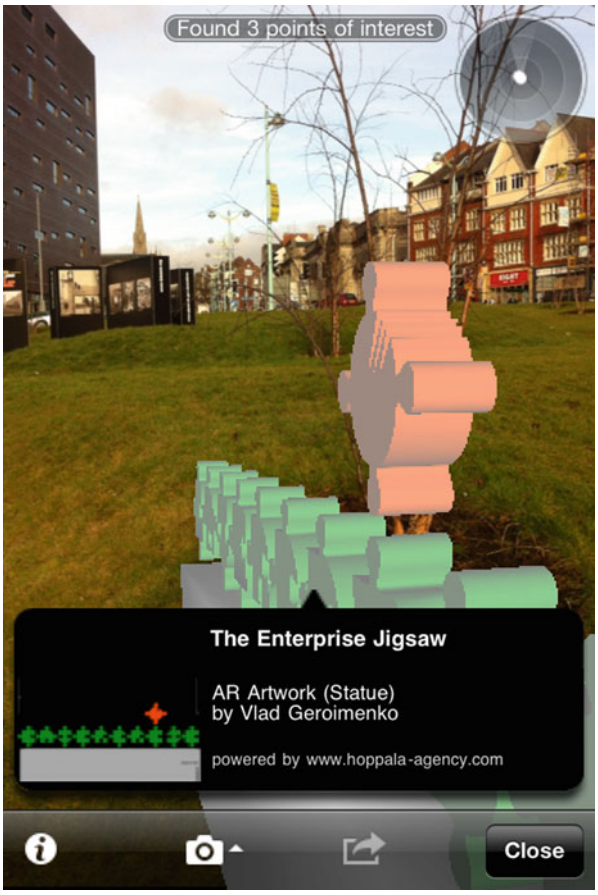

Fig. 10.7 *The Enterprise Jigsaw* by Vladimir Geroimenko, 2011. An augmented reality sculpture. An AR view in the real-world environment of the Jigsaw Garden (iPhone screenshot by Vladimir Geroimenko)

augmented reality interventions. Future challenges are in the materialization of the artworks for sale, to name an important one. Unfortunately, unless the relationship between collectors and the 'object' collected changes in favor of immaterial objects, the problem to overcome for artists that use augmented reality intervention is how and in what modalities to link the AR installations with the process of production of an object to be sold" (Aceti 2013).

Although the problem is common for Augmented Reality Art in general (because of non-material nature of its augmenting objects), there are different types of AR artwork (Geroimenko 2012, 2013a) that may have a dissimilar commercial potential. Augmented reality painting and augmented reality sculpture can serve as good examples of this: a particular type of augmented reality paintings described earlier in this chapter seem to be (at least, for the time being) the best candidates for "AR Art for sale" (Geroimenko 2013b), while the saleability of augmented reality sculptures is rather uncertain and questionable at the moment.

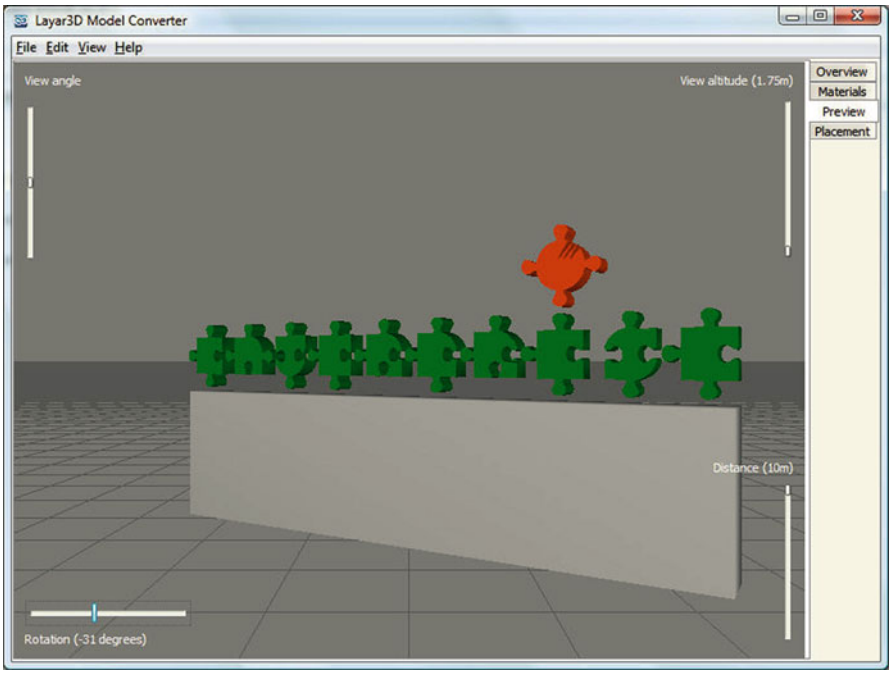

Fig. 10.8 *The Enterprise Jigsaw* by Vladimir Geroimenko, 2011. An augmented reality sculpture. A design view in the Layar3D Model Converter (MacBook screenshot by Vladimir Geroimenko)

In general, the sale of augmented reality paintings can encounter particular difficulties, some of which are rather obvious and can be named *a priori*:

- The key technical issue is the availability of the AR component of the painting: the server can be unavailable for a while or shut down for good, a new version of the AR browser may have a compatibility issue with older content, and so on. However, an AR painter or seller has somehow to be able to provide (despite all possible and unpredictable technical glitches) a warranty that an AR painting will be "functional" for a certain period of time.
- The main creative problem can be the artistic merit of the physical component of an AR painting, as was discussed above. In other words, a limited edition print, hanging on a wall, should be "cool" in its own right. The AR component is intended to enhance it aesthetically, conceptually, and, of course, visually. Furthermore, it presents "the hidden meaning of a painting" in a completely new way, namely by "materialising" its concealed AR parts (i.e. by showing a hidden meaning *in a literal sense*).
- As of today, the major problem could however be the novelty of augmented reality paintings. It will obviously take some time before the current level of knowledge about this new form of art develops significantly to affect art buyers' behaviour. The current situation seems to be a paradoxical catch-22: to become

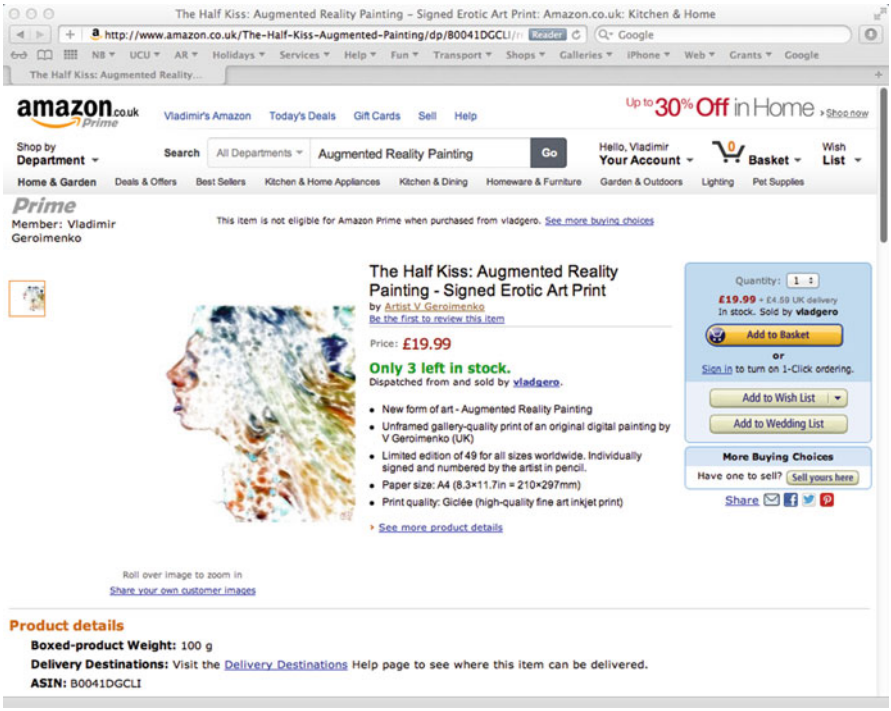

Fig. 10.9 *The Half Kiss* by Vladimir Geroimenko, 2011. The first ever augmented reality painting for sale on Amazon (Amazon 2014)

a popular form of art, augmented reality painting should be in the art market; to become a highly saleable art form, the acceptance and understanding of augmented reality painting should be widespread in advance.

In spite of these real and potential difficulties, the particular type of augmented reality painting, that combines Digital Painting and AR technology with gallery-quality limited edition prints, can provide rather realistic opportunities for breaking into the art market. Rephrasing Frank Lloyd Wright's humorous citation "If it sells, it's art" (Wright 2013), one can say about the emerging Augmented Reality Art in general: "As soon as it is on sale, it will become much closer to universal recognition as a new form of art." Augmented reality paintings should and hopefully will find their way to private collections around the world.

The proof of the concept of saleability for this specific type of augmented reality paintings has been a success – some paintings from the *Hidden Realities* Exhibition are now available on Amazon (Amazon 2014). In fact, the painting *The Half Kiss* has probably become the first ever Augmented Reality Painting for sale and it was certainly the first ever AR painting for sale available on Amazon (see Fig. 10.9). At the time of writing of these lines, none of its copies have been sold, so how can we be sure *a priori* that some of them will sooner or later have been sold? All the

previous experience of the author of this chapter indicates a strong possibility. He started selling his limited edition art prints in 2009 via the Online VG Art Gallery (Geroimenko 2009), Amazon and eBay. To date, many signed gallery-quality prints of his digital paintings have been sold to private collections in several countries (UK, USA, Canada, Australia, Germany, France, Spain, Switzerland, Holland, Finland, Malta, Brazil, Mexico, Russia and Belarus).

Therefore, it is quite possible to conclude that this type of augmented reality painting is in principle saleable, because the physical part of an augmented reality painting is essentially identical to a regular art print sold by the author earlier. This also means that in a good augmented painting, the physical part (e.g. art print) should have a significant artistic value on its own, since it is supposed to be exposed on a wall all the time. Its augmented reality component may complete the painting in several ways (e.g. visually, conceptually or aesthetically), but only from time to time (when someone is viewing the painting through an AR-enabled device).

The saleability of augmented reality sculptures is much less certain, and presumably depends on the type and also the size of a sculptural artwork. Small augmented reality artworks (figurines, busts, carvings, and the like) that are based on the use of augmented reality markers and image recognition technology can in principle be put for sale in the same way as the augmented reality paintings described above. In such a case, an augmented reality sculptural artwork has to consist of the following two parts: a small-size augmented reality sculpture (the main part) and a marker (the auxiliary part). The latter can be a purely technical (but aesthetically good) pattern to trigger and to correctly place the 3D digital sculpture or it can be a printed or painted artwork that is meaningfully connected and artistically integrated with the main piece of art, namely the augmented reality sculpture *per se*. Figure 10.10 shows an experimental work of this type produced by the author: an abstract augmented reality statuette (a simple 3D shape) placed on top of a conceptually unrelated (meaningless) augmented reality marker – a black and white print of a surrealist painting by the author.

Our working hypothesis is that this type of sculpture could be saleable in a similar way as the described augmented reality paintings. The buyer would have purchased an augmented marker (that itself could constitute an artwork) and place it on the floor, on a table, on a wall, and the like. After this the art collector can enjoy the "hidden" AR sculptural artwork by making it visible in an augmented reality browser and by moving himself or herself around it in order to see the 3D creative work from any possible angle.

An "opposite" large-scale type of augmented reality sculpture may include gigantic artworks that are placed into a physical location using GPS technology rather than visual markers. Such artworks are suitable for city squares, historic landscapes and similar vast environments. It seems unlikely (at least, at the moment) that such augmented reality sculpture can be sold via Amazon or eBay. However, an artist could be commissioned to produce a sizeable augmented reality sculpture by, for example, a City or Art Council.

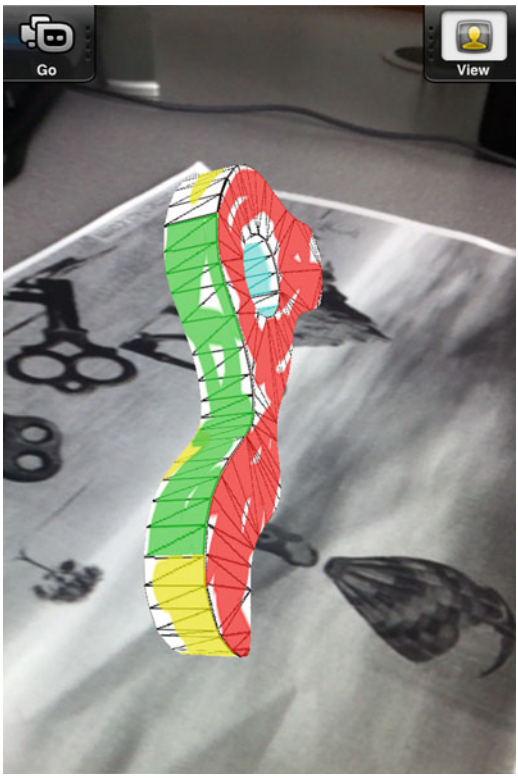

Fig. 10.10 *Untitled* by Vladimir Geroimenko, 2011. Augmented reality statuette (Experimental work)

10.5 Conclusions

Augmented Reality Painting and Augmented Reality Sculpture are newly emerging forms of art that may encompass a variety of particular types of artworks. Some of them can be highly technological and interactive and to this extent bear resemblance to computer games. At the same time, some of them can intentionally not rely on interactive multimedia technologies and be closer to traditional forms of paintings and sculptural works. In this case, conventional paintings and art prints can easily be extended, enhanced or embellished with hidden AR objects that are able to convey a deeper meaning of the artwork. This type of augmented reality painting possesses all necessary features to become popular and saleable art in a similar way as its traditional predecessors. Augmented reality sculpture has a more modest sale potential, but in many cases can be commissioned to be "erected" in public places instead of expensive physical sculptures.

References

Aceti L. Not here, not there: an analysis of an international collaboration to survey augmented reality art. Editorial to not here not there. Leonardo Electron Alm. 2013;19(1 & 2):8. http://www.leoalmanac.org/vol19-no1-not-here-not-there/. Accessed 7 Oct 2013.

Amazon. Search for "Augmented Reality Books". http://www.amazon.co.uk (2013). Accessed 26 Mar 2013.

Amazon. The Half Kiss: augmented reality painting – signed erotic art print by artist V Geroimenko. http://www.amazon.co.uk/The-Half-Kiss-Augmented-Painting/dp/B0041DGCLI/ (2014). Accessed 3 Jan 2014.

Baradaran A. Frenchising Mona Lisa. http://www.amirbaradaran.com/ab_monalisa.php (2011). Accessed 15 June 2013.

Geroimenko V. The VG art gallery. http://www.geroimenko.com (2009). Accessed 28 Mar 2013.

Geroimenko V. Digital photo painting as an artistic and cultural phenomenon. In: Proceedings of the 15th international conference on information visualisation (iV2011, London). 2011. p. 461–4.

Geroimenko V. Augmented reality technology and art: the analysis and visualization of evolving conceptual models. In: Proceedings of the 16th international conference on information visualisation (iV2012, Montpellier). 2012. p. 445–53.

Geroimenko V. Artistic visualisation of practical information using augmented reality. In: Proceedings of the 17th international conference on information visualisation (iV2013, London). 2013a. p. 404–9.

Geroimenko V. Augmented reality paintings: art for sale? In: AR[t]: augmented reality, art and technology, Issue 4. The Hague: AR Lab: Royal Academy of Art; 2013b. p. 68–71.

Google Scholar. http://scholar.google.co.uk/ (2013). Accessed 8 July 2013.

Hutchinson I. Between physical and digital: augmented reality sculpture – 2013. http://www.ianhutch.net/work.html (2013). Accessed 28 Dec 2013.

Jacucci G, et al. Augmented reality painting and collage: evaluating tangible interaction in a field study. In: Human-computer interaction – INTERACT 2005, Lecture notes in computer science. Springer-Verlag Berlin, Heidelberg; vol 3585. 2005. p. 43–56.

Marzo A, Ardaiz O. CollARt: a tool for creating 3D photo collages using mobile augmented reality. In: Proceedings of the 21st ACM international conference on multimedia. New York: ACM; 2013. p. 585–8.

Roberto RA, Teichrieb V. ARBlocks: a projective augmented reality platform for educational activities. In: Proceedings of IEEE virtual reality conference 2012. Costa Mesa, CA, USA; 2012. p. 175–6.

Trevor J. The future of painting? http://trevorjonesart.blogspot.co.uk/2013/08/the-future-of-painting.html (2013). Accessed 18 Nov 2013.

Valbuena P. Augmented sculpture. http://www.pablovalbuena.com/selectedwork/augmented-sculpture-v1/ (2007). Accessed 5 Oct 2013.

Van Eck W, Kolstee Y. The augmented painting: playful interaction with multi-spectral images. In: Proceedings of the 2012 IEEE international symposium on mixed and augmented reality (ISMAR-AMH). Atlanta, GA, USA; 2012. p. 65–9.

Wright FL. Quotes. http://www.goodreads.com/author/quotes/69188.Frank_Lloyd_Wright (2013). Accessed 18 Oct 2013.

Chapter 11
Augmented Reality Graffiti and Street Art

Ian Gwilt

11.1 Introduction

Graffiti has always augmented real-world locations and environments, providing social commentary, unsolicited opinion, proof of occupation, or simply by dint of adding colour and visual content to our utilitarian city infrastructures. Either through the opportunistic act of an addition to an urban surface, or by invitation to create a site specific response to an existing form or predefined public space, 'traditional' graffiti and street art has always had a relationship with the architecture, street furniture, surfaces and materials that define and delineate our urban experience. Invited contribution or not, it could be argued that these interventions help turn Marc Augé's notion of urban non-places into inhabited environments, wherein, today's 'supermodern' spaces are drawn back into a lived and lived in, imperfect experience (Augé 2008). These broadcast images and symbols also transition the public to the personal – an assertion of individuality for both the creator and the viewer – prompting us to question what is our role, interest in, and connection to the community and place in which we live.

This chapter looks at how the concept of Augmented Reality graffiti (AR graffiti) enables us to experience an augmented view of the urban environment. By running Augmented Reality (AR) software on mobile devices such as smart phones and hand-held computers, virtual content including images, audio, messages and designs can be placed into a digitally enhanced view of a city scene. This facility allows us to switch not only between a personal and shared experience of an artwork or urban space but also to experience both digital and analogue versions of the same environment. In this chapter I will examine how the intersection between

I. Gwilt (✉)
Department of Design and Visual Communication, Art and Design Research Centre (ADRC), Sheffield Hallam University, Sheffield S1 2NU, UK
e-mail: i.gwilt@shu.ac.uk; http://www.shu.ac.uk/research/c3ri/people/prof-ian-gwilt

V. Geroimenko (ed.), *Augmented Reality Art: From an Emerging Technology to a Novel Creative Medium*, Springer Series on Cultural Computing,
DOI 10.1007/978-3-319-06203-7_11,

graffiti, street art and AR provides us with a complex socially and technologically encoded interface that has the potential to combine the first-hand experience of public space, digital media and creative practice in a hybrid composition. I will begin by looking at the tradition of graffiti and street art, followed by an investigation into the philosophical implications for the digital augmentation of this type of work. A number of key techniques and technologies for AR graffiti will then be explored, and discussed through the use of two case studies.

11.2 Definition and History of Graffiti

The idea of graffiti in its conventional sense conjures up images of painted words or drawings, sprayed on a wall, possibly offensive, illegal certainly. Where as the notion of 'street art' suggests a more urbane, legitimized activity with perhaps a greater level of artistic merit and community buy-in; we are increasingly seeing more examples of assigned wall spaces and public commissions for street art. For the purposes of this chapter I use the terms graffiti and street art as a shorthand to describe the range of (non-corporate) visual languages we typically encounter in the urban landscape. However this chapter does not attempt to justify or establish a position on a set of activities, which are seen to be by degree sanctioned and unsanctioned, legal and illegal. Indeed the legitimacy and cultural acceptance of graffiti and street art varies quite dramatically and is still very much under debate (Macdonald 2001; Rowe and Hutton 2012), while the works of some well know artists fetch high prices in the art world, other works are regarded as illegal acts. What we are interested in here is the way that graffiti and street art forms part of a shared visual language, and how this language can be adapted and developed in an increasingly technologised society.

It is useful however, to briefly consider how the visual language of graffiti and street art has developed, as a precursor to thinking about how creative practitioners utilizing the potentials of AR technologies might begin to work with these conventions. Anna Wacławek traces the rise of contemporary graffiti back to the signatures, letters and words created by artists on the east coast of America in the 1960s (Wacławek 2011). By the mid 1970s these 'tags', which tended to be quickly created, single colour forms had also developed into more elaborate typographical designs called 'throw-ups' or 'throwies'. These in turn led to the further development of larger more complex 'pieces' or murals, often incorporating figurative elements and involved compositions (Wacławek 2011). These highly illustrative works are more closely associated with the idea of 'street art', visually elaborate combinations of colour, shading, typography, graphic symbols, abstract patterns, cartoon elements and realistically drawn images, used in the formation of carefully constructed designs. As the visual languages of graffiti and street art have continued to expand so have the materials and techniques used to create the works. The traditional use of spray cans, and broad-tipped markers has been extended with amongst other things the introduction of paper and cardboard stencils, which are

used as templates to quickly recreate a predesigned image by spraying through the holes on the stencil. From the artist's perspective this technique has an additional advantage in that it enables the easy creation of multiple versions of the same image. A variety of 2 and 3 dimensional materials, which can be stuck on or applied to surfaces are now also being used to create work.[1] This includes the popular practice of pasting up pre-printed, sprayed or drawn, paper-based posters, which again have the advantage of being quickly repeatable so that large areas can be covered in a tile-like effect should this be desired. A number of other types of painting techniques are used in the creation of the more elaborate pieces, with bespoke processes such as the use of cleaning cloths, water and solvents to create monochromatic images on grimy urban surfaces being developed.[2] Lastly there are a number of new technology graffiti pieces that are created through the use and control of lights, laser beams, data projectors and other digitally facilitated interventions. AR graffiti continues this tradition of expanding the visual language of graffiti and street art by incorporating new techniques and technologies.

11.3 Philosophical Issues for Graffiti, Street Art and AR Graffiti

Aside from the issue of legality, there are a number of other issues worth considering in relation to the idea of AR enabled graffiti. As Wacławek points out, one of the defining qualities of graffiti is that it both assimilates the city environment, as well as recreating it (Wacławek 2011, p. 9). There is a natural vernacular inherent in graffiti and street art, which is played out between its physical location and the social cultural expectations of that environment; and through a dialogue and interplay with the other visual languages of the street, including formal signage, advertising posters and even other pieces of graffiti (Poynor 2001). Through this urban bricolage, created by the juxtaposition of images and surfaces, it is often difficult to establish a visual hierarchy of meaning, importance or legitimacy (Crow 2010). Adding further content to our experience of the urban environment through the use of AR technologies needs then to be considered in the context of this multifaceted ecology of image making and meaning. For example, will located access to extra digital content help to explain the existing physical environment or add to its complexity? Certainly the potential to add virtual layers of content and information to urban spaces speaks to Mitchell's polemic about digitally enhanced cityscapes. In his book 'City of Bits' Mitchell espouses the potential for digital technologies and

[1] See the work of Invader (http://www.space-invaders.com/) and the use of mosaic tiles to create images of space invaders on buildings. In some cases a map of the sites enable people to follow the images around a particular city.

[2] See the work of Paul 'moose' Curtis who is credited with the idea of reverse graffiti (www.symbollix.com/).

technological platforms to hybridize both human experience and architecture, in a way that will help us process and navigate our urban surroundings (Mitchell 1995). Understanding and controlling the socio-cultural, political and economic agendas attached to the addition of virtual content to our experience of the city should be high on the agenda of any emerging AR street artist. Iain Sinclair's politicized interpretation of the contemporary psychogeographical experience suggests that the detached wanderings of the flâneur are a thing of the past and that like our other encounters of the city today, any AR facilitated experience of the urban will be loaded with expectation and purpose (Coverley 2010; Sinclair 2003).

As well as changing our experience of the urban space, graffiti and street art also challenges notions of the ownership of these spaces, especially if the acts of the artist are seen as unsanctioned and interventionist (Wacławek 2011, p. 9). However, it is interesting to consider whether the qualities found in the virtual nature of AR graffiti goes some way to disarming the criminal act inherent in physical graffiti. In a number of ways the mediation of AR technologies produces a benign form of graffiti, since no physical content is added to the environment, and the work can only be seen while the viewer interacts with the space through the AR device. Moreover, the process of creating AR graffiti (through the use of the computer) is quite a different act compared to the visceral nature of creating physical graffiti, which is associated with the smell and sounds of spray paint, the feel and effect of different wall surfaces, and the influences of weather, lighting conditions, environmental population and other hazards. That said, AR graffiti inherently retains a close relationship with the physical environment, and the makers of AR graffiti still need to work closely with physical spaces, sourcing locations, working with a specific site, and building an awareness of the environmental and social influences that impact on the space. Creators of an AR experience may also work with traditional street artists, and the hacktivist/open source mindset of many of the AR makers is sympathetic to the counter-culture positions taken up by many graffiti artists.

However, there is some debate about how and if graffiti is changed when it is sanctioned by the art world, – perhaps through the loss of adrenalin and sense of speed that is engendered through a fear of discovery (Ellsworth-Jones 2013; Macdonald 2001). Like the commodified graffiti of the art world, AR graffiti contains an inherent cultural legitimacy, if not economic value, created by the need for digital technology to enable the experience, and notions of the digital divide. But, although AR graffiti is not yet as ubiquitous in terms of accessibility to conventional street art, the dramatic rise in the use of smart phones, mobile technologies, tablet computers etc. means that the possibility for making and viewing this type of work has the potential to rapidly expand, especially as these enabling technologies become increasingly available and commonplace. Interestingly, as AR street art becomes more popular, it remains to be seen if the existing tension between a desire for anonymity and self-expression/recognition, which is played out between conventional graffiti artists, who communicate with each other through a common visual language and an unwritten code of practice, will be paralleled within AR enabled graffiti (Macdonald 2001). Commonly with AR, and particularly when it is used as an art form, there is no explicit instruction as to what the viewer

will encounter when they follow an AR marker or launch an AR application to look at a piece of work. The viewer can be exposed to undisclosed content that is only revealed once the decision to view and the technological connection has been made. The relationship between the viewer and the creator of the work must be built on trust, experience, and an understanding of the media form. Therefore, successful communication is contingent on establishing a context of use and the setting up of expectations that relate to what is anticipated, and how a viewer might respond/behave when the AR content is revealed. Creators of located AR need to be mindful of both the viewer's expectations and the content of use.

In the following section we will look at different techniques for the generation of AR graffiti and its potential in terms of storytelling through the creative use of media.

11.4 Augmenting What and Where: Markers and Clues, Techniques and Technologies

Early examples of AR used fiducial markers for the tracking and positioning of the viewer or the viewing device. This allowed virtual content to be displayed in relation to the point of view and position in physical space, and for the combining of AR content on a digital screen (Bimber and Raskar 2005). With the development of more sophisticated image processing software and the utilization of combined WiFi, cellular and GPS tracking, and 'Simultaneous Localization and Mapping' technologies (SLAM), many AR applications that now run on mobile devices can directly recognize the visual patterns incorporated within the shapes and images of graffiti and street art. These technologies remove the need for physical/visual markers to be placed in the physical environment. However, although abstract and nonsensical in human terms, the small black and white squares or geometric shapes of these conventional AR markers do operate as a useful device, in that they provided a visual clue for people to recognize that AR content is available. With the new types of 'transparent' AR markers – where almost everything you look at can effectively be tagged with virtual content – the question is, how do we know when and where to look for this content? In the urban environment the existing visual language of graffiti and street art can operate as a useful device for indicating that virtual AR content might also be available in a specific place.

With AR graffiti it is possible to make use of all the conventions of contemporary digital media. Drawn and photographic visual media, computer-generated 3D models, typographic and information graphics, video, animation and audio content can all be used in the creation of AR artworks. AR graffiti can use the potential of digital image making and effects to extend, create and reveal new and additional stories around conventionally made graffiti and street art. However, as observed in the uptake of digital visual effects in mainstream media, the mapping of digital content into realistic scenes needs to be carefully considered, managed and applied in such a way that it adds to the experience of the viewer not detracts (McClean 2007).

A number of early exponents of AR graffiti experimented with ways of recreating the visual languages and techniques of traditional graffiti using the capacities of the digital. One very popular idea was to create spray-painting applications that allowed people to virtually tag and bomb buildings. This reimaging of the graffiti visual language has also more recently included the creation of 3D versions of throw ups, which can be navigated in virtual space, literally adding another dimension to the work. These experiments demonstrate that the scope for creating AR graffiti is by no means limited to a small number of artists, and the displaying of pre-authored content. The phenomenon of social media and the potential to contribute, alter and comment on pieces of work is another aspect of AR graffiti that is being explored. Mobile apps are now available that facilitate user-generated content, which can be created and shared in line with social media conventions. Moreover, AR graffiti can also be generated remotely and realized at a specific location. In one example a well-known street artist continued to create work after becoming physically incapacitated, using specially developed eye tracking software to generate work that was then digitally distributed and displayed.[3]

It remains to be seen if and how the self imposed codes of practice which govern the creation and 'overwriting' of physical graffiti and street art will transfer and be adapted to these virtual creations. However, one advantage with these types of technologically facilitated artworks is that they are virtual, temporary and do not damage or permanently hide the underlying surface or material.

As discussed there are a number of different ways to create a piece of AR graffiti or street art. The techniques for relating AR work to the physical urban environment (and how we encounter it) can be divided into two main categories: First: by the generation of AR content that adds to and responds to existing pieces of physical graffiti or street art, and; second, by the generation of AR work that adds content to or responds directly to physical urban infrastructure or a public space. In the first category existing graffiti typologies such as tags, throw-ups, stencils, stickers, murals and other interventions are added to through the use of AR technologies, which are viewed through a digital device such as a mobile phone or hand-held computer. In the second category the physical infrastructure or public space is directly augmented with virtual content layered over, for example, the surface of a building, pavement, piece of street furniture or existing signage. Alternately AR content might be located and realized in 'empty' public spaces such as parks, alleyways or underpasses where it can be discovered and revealed with the aid of a digital device and the recognition of a particular location. In the following section I will introduce two case studies, one that places AR content relative to existing public artworks as outlined in the first category, and one that responds directly to everyday street furniture and urban structures as defined in the second category.

[3] See the work of the Graffiti Research Lab and the 'eyewriter' at http://eyewriter.org/.

11.5 Case Studies

11.5.1 Case Study One: BC Biermann and the Heavy Projects

In the work of BC Biermann and 'The Heavy Projects' initiative, highly illustrative paintings (produced by mural artists) are combined with virtual content to augment the original images (Biermann 2013). In these works mobile devices running the Re + Public AR app allow the public to view virtual additions by pointing a mobile device towards a real-world mural and looking through the digital screen (Fig. 11.1).[4] By doing this AR content is mapped onto the screen image of the mural. The digitally generated content is used in two ways: first, to change the image content within the 2D picture plane of the mural by creating pictorial and animated sequences that 'overprint' and narrate parts of the original image. Second, by adding substantive additional virtual content that appears to spill out into the urban environment, dramatically extending the work above and in front of the original image. In different examples illustrations of people, plants, letterforms and geometric shapes create a temporal narrative around the original murals, as they are animated and move out into 3 dimensional space. In some instances virtual content sits on sequential layers like the images in a pop-up book, in others it hovers in space, in imitation of solid 3 dimensional objects. In one work the addition of luminescent waterfalls allows the mural to be seen in the dark; in another, oversize geometric shapes and patterns shimmer and move in front of the mural, reforming in different combinations for different viewers and different occasions. People and cars appear to move in out of the virtual layers as they go by, and the combined content as seen in the screen of the mobile device can be viewed as you would a painting in a gallery – allowing you to walk close to the work to examine a particular detail –

Fig. 11.1 The Heavy Projects, *How & Nosm mural augment* (2012) Full view [L], Screenshot [R] (Images reproduced courtesy of the artist)

[4] A number of murals were augmented as part of a collaboration called "Re + Public" (http://www.republiclab.com) which took place with Jordan Seiler, a NYC based artist who also runs Public Ad Campaign.

Fig. 11.2 Two works by Shannon Novak, *Transcription -36.848264,174.762129* (2013) [L], *Manhattan Phrase Site 4: 40.737755, -73.997383* (2013) [R] (Images reproduced courtesy of the artist)

or step back to see the whole piece. However, unlike painting or a conventional piece of street art, the viewer can move through the layers, giving the impression of being inside the artwork. With these AR works the artists are very much concerned with rethinking the use, perception and boundaries of public space and they adopt mobile AR technologies to allow people to experience the urban landscape and their relationship with it in a different way.

11.5.2 Case Study Two: Shannon Novak

Shannon Novak describes himself as a synesthete, someone who can see colours and sounds in everyday objects. In many ways AR is the perfect medium for a digitally informed artist who can pick up on the resonances and cross-references between digital media forms. Novak's AR work builds a relation between compositions of staccato notes and geometric forms to not only create a discourse between audio and image, but also between digitally generated content and the physical environments that they are mapped onto (Novak 2013).

Novak describes his work as compositions for objects and spaces, and he uses the sides of buildings, public parks and street signage as canvases for his work (Fig. 11.2). However, these real-world artifacts and spaces are more than simply placeholders for virtual content, as the digital audio/visual animations that make up Novak's work are created specifically for each location. Each site is considered from a number of perspectives, which include the physical geometry, the surrounding environment, and other socio-cultural and operational connotations that might be associated with the place. These factors are then used to inform animations consisting of formal compositions of abstract geometric symbols, colour and music, which unfold over the virtual surface of the physical location or artifact.

Interestingly Novak makes the point that unlike conventional graffiti, which can be physically removed or painted over, the evanescent nature of AR graffiti means that it is in some ways harder to regulate. Moreover, the virtual nature of AR means that it is relatively easy for the artist to change, adapt or update the work. Novak's observation that AR graffiti can also hide physical spaces or activities is an interesting proposition in relation to how graffiti and street art can shift the communal perception of a public space. In the work "Manhattan Phrase" Novak creates personal AR responses to the musical history of 12 different sites on 14th Avenue, New York. Laden with cultural histories these sites are reimaged and reimagined through Novak's AR interventions that blur the empiric moment with augmented sound and image, and work as a sort of shorthand to the patina of personal and social memories and experiences that can build up over time in the same location.

In considering these two case studies it should be remembered that the conventions and rules for this new media form (and how it might be experienced in the public domain) are as yet, not fully developed or broadly understood by the general public or indeed defined by the creators of the works. Informing people where AR content might reside in the urban environment and how it should be accessed and or responded too is still a work in progress. Novak is aware that audiences react differently to his AR creations as they experience them in situ; from the response of the techno-evangelist who is happy to embrace the concept of AR graffiti and willing to initiate others into the experience, through to confused but interested first time users, who find different ways of engaging with the work. This interest in how AR within a public space might begin to accommodate a broad level of social inclusion and meet the needs and the desires of the community is something that also resonates with the designers of the Re + Public app. As technological access improves and the public understanding of this type of work increases, more examples of work from practitioners in the field will help facilitate and define the potential of AR graffiti and its contribution to a shared urban visual language and culture.

11.6 Conclusions

Generally speaking all graffiti is a form of addition (welcome or not) to the visual language of the public realm. Similarly the concept of AR graffiti allows us to reimagine and contribute virtual content to public infrastructures and shared spaces. Like traditional graffiti there is always a connection between where we encounter the AR work and the physical environment. This relationship is made simply by the fact that AR graffiti has a 'fixed' geo-location or a specific viewing point that the viewer needs to occupy to activate the work. The 'located' nature of the AR graffiti, both in terms of place and context means that it is possible to create a dialogue between a physical location and the content and design of an AR work.

Within this chapter we have looked at how the concept of AR graffiti has the potential to build on the visual languages of street art and graffiti, and the urban

infrastructures of a modern day city environment, as part of the ongoing fusion between analogue and digital content. AR street art and graffiti contributes to the confluence of when, where and how we experience these two paradigms in tandem. The dialogic potential of AR graffiti marries urban social narratives and personal experiences with the dynamic potential of the digital and the tacit authority of material form. The difficulty for this type of located AR lies in ensuring that the relationship between the digital virtual and physical real is a symbiotic one that draws positively on the technical and cultural qualities and properties inherent in both analogue and digital paradigms, to fully make use of the potentials of the hybrid AR experience.

Advancements in the development of wearable head mounted displays such as Google Glass are bound to have an impact on this fledgling practice. While, immersive Virtual Reality (VR) has proved to be less popular than initially imagined we are beginning to see some renewed interest in the use of VR outside of the conventional gaming or multi-user environments. However, within the urban environment the use of digital accessories, such as the headphones worn by cyclists or joggers that disconnect the wearer from the here and now are still regarded with some consternation by most people. Perhaps the key strength of the use of AR in the public realm is realized through the capacity to rapidly switch between real-world and augmented experiences as necessary and as desired, and the ability to move between both a private and communal, shared experience of the urban environment.

References

Augé M. Non-places: an introduction to supermodernity. 2nd ed. London: Verso; 2008.
Biermann BC. http://www.theheavyprojects.com/augmentedreality/ (2013). Accessed 5 Dec 2013.
Bimber O, Raskar R. Spatial augmented reality: merging real and virtual worlds. Wellesley: A K Peters Ltd.; 2005.
Coverley M. Psychogeography. London: Pocket Essentials; 2010.
Crow D. Visible signs: an introduction to semiotics in the visual arts. 2nd ed. Lausanne: AVA Publishing; 2010.
Ellsworth-Jones W. Banksy: the man behind the wall. London: Aurum; 2013.
Macdonald N. The graffiti subculture: youth, masculinity, and identity in London and New York. New York: Palgrave Macmillan; 2001.
McClean ST. Digital storytelling: the narrative power visual effects in film. Cambridge, MA: MIT Press; 2007.
Mitchell WJ. City of bits: space, place and the Infobahn. Cambridge, MA: MIT Press; 1995.
Novak S. Works. http://www.shannonnovak.com/works/works.html (2013). Accessed 5 Dec 2013.
Poynor R. Obey the giant: life in the image world. Basel: Birkhäuser; 2001.
Rowe M, Hutton F. 'Is your city pretty anyway?' Perspectives on graffiti and the urban landscape. Aust N Z J Criminol. 2012;45(1):66–86. doi:10.1177/0004865811431327.
Sinclair I. London orbital: a walk around the M25. London: Penguin; 2003.
Wacławek A. Graffiti and street art. London: Thames and Hudson Ltd.; 2011.

Part III
Cultural, Social, Spatial and Cognitive Facets of Augmented Reality Art

Chapter 12
Why We Might Augment Reality: Art's Role in the Development of Cognition

Judson Wright

12.1 Introduction

In discussing Augmented Reality, it is common to begin with art: the premise that art exists, that computers are one means to create it, and that AR is one motivation to create computer art. As art is primarily assumed the domain of aesthetics, this further leads one to scrutinize computer art in light of a means of expressing aesthetics. While hardly inaccurate, this path is a misleading for us here. Behavioral Art (BA), and its relationship to AR, is profoundly different. To consider BA, we are required to abandon the notion of aesthetics, at least temporarily. We begin by thinking instead about linguistics and development in a somewhat novel way.

For instance, when discussing cars, it is quite ordinary to tacitly assume that the car is used as mode of transportation. We do not ordinarily assume the discussion will be about the car as a couch. When discussing seating in general, car seats are likely considered. Likewise, the computer's unique and unprecedented ability to execute code is implicit in our discussion of computers. Just as one could freely purchase a car, only to be used exclusively as a couch, a computer certainly can be used for media. However, this possible case is not pertinent to our investigation here. Moreover, the influence of psychology on human experience is far more central to BA (Hoffman 1998).

Furthermore, media creation, presentation, and/or editing have long been accomplishable using analog tools. There would be no reason in a discussion referring to media, but arbitrarily only to certain tools and not others (Reeves and Nass 1996: 193–210). On the other hand, when we discuss the process by which we conceive of some problem in terms of a logical syllogism or *algorithm*, notating the logic into

J. Wright (✉)
Artist/programmer, Pump Orgin, New York, NY, USA
e-mail: art@pump.org.in; http://pump.org.in

V. Geroimenko (ed.), *Augmented Reality Art: From an Emerging Technology to a Novel Creative Medium*, Springer Series on Cultural Computing,
DOI 10.1007/978-3-319-06203-7_12,

one of several particular formalized codes, to be rendered mechanically, only one such tool excels far above any previous invention. In discussing programming, there is little impetus to mention couches or media. Though these may possibly occur in isolated cases, they are unrelated to programming and thus our discussion here regarding this programming tool.

12.2 Development

We humans are unique from other species, in that we undergo an unusually long period of development. Since this is 'costly' in terms of survival fitness, it is unlikely to be accidental. It also indicates that the minds we enjoy are qualitatively different than minds assembled for briefer purposes. Shorter-lived organisms and machines function sufficiently without need to fine-tune behaviors to an unpredictable environment. Though Behaviorism was generally abandoned decades ago, the model of *instrumental conditioning* (IC) remains deep-rooted in popular conceptions about learning. A ramification of IC is the view of communication proposed by Claude Shannon (Ash 1965; Shannon and Weaver 1949). Even that children are tested and receive grades is a form of reward/punishment aimed at training for a desired response. Though many children do benefit from this traditional methodology, it is hardly universally helpful, and can even be debilitating for students (Dewey 1910; Kohn 2008; Phillips and Soltis 2009; Tough 2012).

12.2.1 Machine Learning

No doubt, the inner workings of the pre-processor in the computer, may strike many readers as unnecessarily esoteric. Unfortunately, the counterintuitive details addressed in this preliminary section illustrate are a fundamental premise in BA and give AR its role therein. Beyond casual conversation and speculation, the common sense model of *machine learning* applies exclusively between machines and not to organic brains (further discussed in Wright 2012a, 2013a). Shannon's heavily influential notion of communication is prohibitively restricted from development, and thus learning, in any biological-like sense, where learning is not entirely synonymous with causality (Fischer 2011). In Shannon's defense, much more is known about the learning process, than was available to him at the time. Though we might refer to successful strategies of stimulus storage, transferal, retrieval, and broadcast, these are only preliminary tasks, insufficient to account for "borrowed intelligence" (Wright 2013b). Particularly insightful has been the more recent distinction in linguistics between *signaling* and *communication*.

A qualitative difference lies between signaling, where a unitary message is sent and received and is not generalize-able to other contexts, and communicating, where multitudes of messages effect the further stream of messages as per the needs of

the conversationalists involved. Both synchrony and self-synchrony are extremely relevant in that signalers, such as nonhuman animals and machines, do not reflect messages by other physical means than the medium specific to conveying the literal message (Bavelas et al. 2002; Knapp and Hall 2006: 43–54). In other words, the message is fully formed prior to being broadcast. Rather the message is one of several means for directing the interaction. Once we have better understood how problems are solved in organic minds, via some form of nonverbal communication, we will then revisit how the computer might be implemented as a prosthetic tool (Licklider 1960; Wiener 1950). Though it is popular to say that computers and brains are nothing alike, it is also popular to apply the same model of processing to the brain as to machines, with only a vague sense of how processing might take place. For this reason, while we do not intend to outright debunk the notion that intelligence can be synthesized (Horzyk and Tadeusiewicz 2005), but do need to initially discuss a nuance of processing, which bears on a particular role of communication and consciousness.

Computers are mechanical tools, which inventors have adjusted to correspond to our concept of mathematics. Programmers then apply this numerical correspondence to concoct complexes of syllogisms, which can be further reformulated in very un-mathematical-looking graphics. Insofar as one might *metaphorically* envision circuits and transistors as hierarchical conditional tree diagrams (*as in* Lakoff and Johnson 1980), the same root assemblage of concepts in the mind that allow one to make sense of Boolean logic are applied to digital processing. The assumption is that this empirical scheme applies to any cognitive function may be more about personal perspectives than about a priori truths (Baron-Cohen 2009; Boyd 2004). The case is argued passionately both by those who feel this is obviously true (Shanahan 1997; von Neumann and Morgenstern 1944; Glimcher 2009) and those who feel this is ridiculously impossible, particularly considering human interaction (Ackernan and Bargh 2010; Edelman 1992; Koch and Tononi 2011). "Every Boolean function no matter how complex, can be expressed using three Boolean operators only: And, Or, and Not." (Nissan and Schocken 2005: 9) The question remains then whether every task can be expressed as a *conditional statement,* using one of several variants on the theme "if x, then y."

A less obvious point remains that the experiences presented in ordinary daily living are extremely unlikely to prove sufficient to account for the complex concepts, which we entertain. It is further restrictive that, due to the evolutionary construction of the brain and DNA, a "lesson plan" must simultaneously be somewhat useful in our current environment, but applicable to some ancestral species-specific environment (Bjorklund and Pellegrini 2001). Olaf Sporns, in his overview of neural networking, states that "Nervous Systems do not converge onto a final stable pattern of optimal functionality, rather, their connectivity continues to be in flux throughout life." (Sporns 2011: 252) Thus, no matter how similar a neural network in an organic brain and one in software process computational tasks, there is still an additional, perhaps far greater task, which is not remotely addressed by mechanical means, in ongoing re-contextualization of data, from generalizing to other domains, to inferring detailed implications (Koch and Tononi 2011). Because this ability, is not

Fig. 12.1 Even at the detailed level of the internal workings of the computer processor, essentially a transistor of switches, physical laws merely operate in non-complex chain reactions. Mechanical intelligence can only be accomplished by the computer, as much as it might by configuring dominoes

instantly formed, but develops gradually via subjective learning, it is not a candidate for the static instructions of software. Insofar as physical laws, the inner workings of the machine are chained merely like dominoes (Fig. 12.1).

12.2.2 A Grouping Impulse

Humans also have a tendency to speak of messages metaphorically (in the non-technical sense) as packages that are designed by some external force, and travel to us, into our minds. Beyond the convenience it may provide in colloquial conversation, it is highly speculative and assumes dualism, that the mind and brain are linked by some mystical force, that is not subject to physical laws. Though a few researchers have questioned this Platonist view in the last 100 years or so, it would appear to remain the devout doctrine of uneducated laymen and the most educated scientists of most every field alike. Furthermore, these messages need not come from intelligent sources. Rather, a message received seems to indicate intelligence in whichever source the recipient assumes authored the message. Of note here is *attribution theory*, in particular the famous experiment by Fritz Heider and Mary-Ann Simmel (1944), where subjects were shown an animation of simple geometric shapes. Afterwards, the subjects nearly unanimously described the events on screen as if the shapes had personalities and volition. Likely each individual did realize that these obviously drawn shapes could not possibly behave in social ways. Regardless, it is notable that the subjects suspended belief to the extent that it becomes vague exactly how much these subjects insist their descriptions reflect their interpretations.

Though we might argue that the ability to contextualize information, even symbolically, allowing for prediction, which increases fitness (Wiener et al. 2011). It is not evident how envisioning a holistic world with a degree of detail would be essential to prediction of some isolated event, which could easily be conceptualized/detected independently. A crucial distinction need be made between volition and execution, for instance in attributing "intelligence" to entities that appear animated. Computers manage the assembly of computers. But *recursion* is hardly sufficient. What is intelligent is that the execution is not an end, but a means concocted, with no explicit connection provided between the goal and the strategy. In this scenario, there is no reason to believe the computers coming off the assembly line are intelligent. The computer/manager is only routinely obeying code. Only the human who designed this system as a solution to a personal need shows actual intelligence. The managing machine cannot be said to have needs. But the attribution of personality traits to the inanimate computer/manager often fools not only those in search of evidence of *artificial intelligence*, but many of us who merely engage in tool-use during play.

However, before we decide that this *impulsive projection of communicative meaning* (Wright 2012a) is an inaccurate – and thus "wrong" – view, consider alien abduction stories. In many cases, the truth of the matter is not actually proveable, nor is ultimately relevant. What often is the case, these soon-to-be-abductees (StBAs) suffer from some experience that is inexplicable within the world they have constructed (Clancy 2005). This event need not be traumatic, but may simply be a temporary paralysis of mundane causes. However, in the larger scheme, the StBA, may feel life has been unusually difficult, disappointing, and depressing. Though alien abduction would hardly be the first explanation to justify the disconcerting event, eventually all other reasons fail to satisfy the StBA. Alien abduction further has the benefit that the StBA, who previously felt undistinguished by luck, can now feel chosen. A peculiar result, that Susan Clancy found, was that once the dubious alien abduction story was accepted, the abductees outlook changes for the better. A possibility then is that the alien story, though perhaps even false, was a "white lie" invented by the psyche to heal a much broader problem in processing experience. Active, devout response to other worlds, fantasized or concrete, as if these worlds are realities, can be psychologically beneficial.

A peculiar and unique tendency in humans, we discuss extensively elsewhere, is to impulsively elect to divide fluid stimuli, such with as *allocentric* (as opposed to *egocentric*) space into meters, sounds into frequencies and frequencies into discreet pitches, the rainbow into hues, and so on (Wright 2010, 2013b). These groupings are in no way real, but imaginary yet salient byproducts of a human perception process. Particularly when we consider that the computer, which appears to calculate ideally, we are forced to consider what purpose might this idiosyncratic grouping effect serve?

"One notable feature of the major scale is that it contains several intervals whose frequency ratios approximate small, whole-number ratios. For example, … 3/2, 4/3 and 5/4 … This is no coincidence. Western music theory has long valued intervals with simple, small-number frequency ratios, and these ratios play an important role

in Western musical structure. The Western fascination with such ratios in music dates back to Pythagoras, who noted that when strings with these ratio lengths were plucked simultaneously, the resulting sound was harmonious. Pythagoras had no real explanation for this, other than to appeal to the mystical power of numbers in governing the order of the universe" (Patel 2008: 15; *see also* Levitin 2006: 37).

As any salesman will tell you, insisting that customers "buy it!" will not be nearly as effective as when customers come up with the idea to do so *on their own*. What is interesting is the very personalized ways in which each individual 'comes up with it'. Howard Gardner's *Theory of Multiple Intelligences* (Gardner 1983) is a good way to think about this. Gardner shows how children may learn better by seeing a colorful example or may learn better by singing a song in a group, but will tend to choose their own *learning style* in play (Humphrey and Gutwill 2005; Piaget 1962; Sfard 2008: 76–80), though are often restricted somewhat by which 'teaching styles' are readily available within the child's culture (Castelfranchi 2011). Even if we concede that the practice of art *appears* to have grown out of markings of environs by artists, in the parlance of Chomsky (1957: 15; Hauser 1998; Chomsky 2000), art serves a far more crucial function as a deeper structure and less surface grammar/effect/decor, as an *in-obvious* biological strategy that has evolved for cognitive development and maintenance.

12.3 Augmentation

Though it is popular to say that learning occurs socially, what we intend to investigate is the means by which cultural groupings of behaviors are distinguished from non-cultural events and behaviors of other cultures. This subtle exchange requires not just dictating of factual data, but confirmations and clarifications to coordinate participants (Millikan 1995; Wright 2012a). Furthermore, how might we show our "nod of agreement" or ask questions? In discussing this essential social aspect of learning, Lev Vygotsky's influential theory regarding how minds learn (1986) makes a reasonable assumption about the relationship between social behavior and culture, but it is an assumption nonetheless. Firstly, it assumes that culture actually exists externally to the perceiver, rather than as an internal conceptual gestalt. Secondly, it does not take into account human's predisposition toward grouping as essential to perception, interpretation, and subsequent conceptualization. This is where AR comes in. What physical, concrete cues exist that might reveal that social behavior is manifested in intelligently organized clusters, which we might call culture? Before answering, consider that the man-made machine (ie. a computer) can only detect and calculate exclusively employing concrete physical reactions. In other words, AR is a technique by which a computer views reality, devoid of the subjective associations which humans experience the world. At this point, we find that art serves all three crucial roles. An author embodies a cultural concern. An audience member can either show interest (eg. visit the art gallery) or further create

embodied concerns that are non-non-sequiturs. These culturally specific concerns are profoundly amorphous, and so we will begin with the simplest format, story-telling.

Story telling as a linguistic exercise is useful for development of older children, who are comfortable with verbalizing thoughts. However, by "story telling" we refer to something beyond merely descriptions of imagined events. It is the ability to organization of conceptual objects and understood dynamics. Early training on the violin, or listening to Mozart Campbell (1997), was believed to enhance general intelligence, the impetus for this resting on dubious understanding of the brain. For these younger children though, this can be a frustrating, as the necessary neuroanatomy has yet to be fully developed. There is even some informed speculation that pressure to conform to premature learning has long-term harmful effects (Several criticisms are discussed in Bjorklund and Pellegrini 2001: 248). Though intuitively one would think early academic exposure might be stimulating, the scant evidence does not indicate this. More precisely, not all expression is equally "good for you." Written story telling may only be helpful to students who demonstrate a certain level of linguistic affinity. It likely only aggravates development to train earlier. Whereas pre-language-fluent children would likely be better off making torn paper collages, in order to describe an event.

It appears highly likely that art, as it is commonly understood, certainly including organizations of kinesthetic movements as dance and sounds as music, is practiced exclusively by humans. But to say this, immediately calls to question, how we distinguish art from non-art. Not too long ago, the label "artwork" was primarily limited to paintings, sculptures, media that had long traditionally been identified as art. Dance, music and drama were always considered art forms, though audiences felt comfortable that only an occasional break of 'the fourth wall' would challenge these labels. Serious reconsiderations were applied to architecture, craft, and so on (Benjamin 1929). John Cage, Jackson Pollock, Andy Warhol, and countless others had certainly revealed insufficiencies inherent in this labeling scheme (Cage 1961; Joseph 2003). Subsequently, it became popular to announce that, "anything could be art!".

This is equally disturbing. While originally, the label was used in ways the audience was not fully acknowledging, this alternative rendered the label fairly useless. Perhaps, a precise definition is elusive and subtle, but a *distinction* is made. Certainly, the thermostats on the wall at the Metropolitan Museum of Art do not receive the same attention as the paintings (Fig. 12.2).

"In the early nineteenth century, theater, such as the plays of William Shakespeare, attracted rich, middling, and poor alike, each seated in its own section and all participating in the performance. Audiences maintained control of the show by demanding encores of favorite parts, throwing vegetables, and even leaping onto the stage to interact with the actors, As middle- and upper-class Americans became more uncomfortable mixing with the lower classes, they began to demand separate theaters in which the audience remained passive and silent [...] By the end of the nineteenth century, Shakespeare, along with opera, classical music

Fig. 12.2 A thermostat at the Metropolitan Museum of Art in New York (Photo by the author)

and museum art exhibitions, became high art forms, and popular commercial culture emerged as entertainment opposed, and separate from, 'high brow' culture" (Morrow 2006: 10).

12.3.1 Creativity

Just as optical phenomena (visual art) are subject to gestalt principals, so too are sonic phenomena (music) (Bregman 1999). But gestalt alone is not sufficient to impart meaning. Consciousness of a sensation is not simply the detection of sensation, supplemented later by the prefrontal cortex. Insofar as *frames* are cultural artifacts, human socialization (whether essential or not, but lacking any practical alternatives) provides the initial step and direction of subsequent steps. Even if that interaction is merely the internal mental shift of attention (Ackernan and Bargh 2010; Dewey 1910: 16–155; Schmeichal and Baumeister 2010: 29–50; Searle 2001: 33–60).

Like language, every culture it seems has a music theory that often differs in (learned) details, but between peculiarly limited parameters, making music a prime candidate to compare with language (Lerdahl and Jackendoff 1983; Patel 2008). Perception is culturally framed in composition and perception (Cohen 2006; Levitin 2006: 57, 73–79, 114). Thus some system must be shared between composer and listener for the music to make any sense (Jourdain 1997: 74–78, 128–134; Becker 2004: 108–116; Doidge 2007: 303). And like language, the grammar is rather culturally specific. A piece that created music for an American audience, would be meaningless for a tribe in Bali (Kartomi 1980; Gold 2005; Wright 2012b) or on a tour deep into the Middle East (Zonis 1980; Arbabi 2000) where exposure to Western music is minimal. A key element is interest (Dewey 1910: 30–34; Allen 2004: 114), which is primarily interactively formulated by experience and culture.

Noise must be potentially interesting before the brain determines that it is music and worthy of a fuller assessment (Humphrey and Gutwill 2005). The role of some music theory is similar to Chomsky's deep structure, as revealed in his famous "Colorless green . . . " quasi-sentences (Chomsky 1957: 15).

Babies make nonsensical babbling en route to becoming children, who invent nonsensical stories before growing into eloquent adults. Manipulation of symbols, graphic, vocal, and otherwise, is an essential technique to learn, in order to communicate, but communication is not at all the manipulation of symbol systems, otherwise identified as aesthetics (this issue is discussed further, regarding 'picturesque' written languages such as Egyptian hieroglyphs, Chinese and particularly Mayan script Coe 1999: 17–33). Recall that in a biological view even noise serves a function, unlike most sciences where 'signal noise' is disregarded with the unrealistic the desire to eliminate it. In recent neurological work, what we might be tempted to disregard as a baseline of noise may also serve an intrinsic global networking effect (Sporns 2011: 149–169, 174–175). Both Vygotsky (1978) and Piaget (1929, 1971) further point out that at about four, the child will recite a narrative, described as egocentric speech as that child approaches a problem (Crystal 2005: 83).

"For example, a four-and-a-half-year-old girl was to get candy from a cupboard with a stool and a stick as possible tools. [The] description reads as follows: (Stands on a stool, quietly looking, feeling along shelf with stick.) 'On the stool.' Glances at experimenter. Puts stick in other hand.) 'Is that really the candy?' (Hesitates.) 'I can get it from that other stool, stand and get it.' (Gets second stool.) 'No, that doesn't get it. I could use the stick.' (Takes the stick and knocks at the candy.) 'It will move now.' (Knocks candy.) It moved, I couldn't get it with the stool, but the stick worked.' In such cases it seems both natural and necessary for children to speak while they act; in our research we have found that speech not only accompanies practical activity but also plays a specific role in carrying it out" (Vygotsky 1978: 25).

It would also be reasonable to say that the child is actually always attempting to use linguistic ability as an initial step in problem solving. However, infants initially lack conceptually, and hence 'babble' (Eliot 1999: 370–371). Importantly, Piaget also writes that children undergo a crucial transformation in distinguishing between internal and external worlds. Vygotsky's observations, quoted above, are all the more poignant when taking into account Piaget's *nominal realism*, the belief that words themselves are concrete substances, which are initially intrinsic 'appendages' of the objects named. Then the words are located in the environment and, finally, conceptualized in the mind. At an early age, the word "lamp" is usually thought to be located initially in the young speakers' mouth (Piaget 1929: 71–72). A year or so later, the child may deduce that it is within the lamp (pp. 72–75). By about 9-years-old the word is seen as in the mind (pp. 78–80).

It has been theorized that the cave paintings of Lascaux were the remnants of a belief in magic, where these symbolic images were thought to influence hunting expeditions (Campbell and Moyers 1988: 79–81; Solso 2003: 52, 86–87). This is obviously an AR, simply long before the invention of computers. A hunt too can be

seen as a problem-solving task, and thus an in doing so, the hunters might narrate plans in a chosen symbolic system. Robert Jourdain (1997: 305) and others have hypothesized that because the precise sites in those French caves where paintings were found had far better acoustics than other spots in the same cave, it was likely that the painters were accompanied by song. Theories regarding child development seem to reinforce the plausibility of these speculations. Singing may be a form of problem solving, as is painting or coordinating muscles in behavior (Curtis 1992).

This, coincidentally, is applicable to categorization of color perception, and exactly Joseph Campbell's point (1949), based on Jung (1935), mentioned previously, regarding mythologies throughout the world. The crucial step in all of this is for us to recognize that myth is not only culturally specific, taught and learned by culture, allowing the individual to membership that culture, but also allowing for neurological fine-tuning, as with trance. This describes music as well. In fact, music and myth are essentially the same, save the trivial matter of modality. That we might devoutly believe sonic events to be profoundly distinct from conceptual organization is ultimately a matter of how well we are fooled by our own ability to apply categorizations.

12.3.2 Utilizing Reality

A piece which gathers text from RSS feeds and converts the ASCII characters found into musical pitches would certainly qualify as AR. However, in the larger scheme, this experiment failed in the way it set up a relationship between the intelligently organized text and chaotic output of the musical composition software. In *Composomatic* (2008), information was gathered from multiple feeds and thus from multiple authors, with multiple unrelated contexts. No singular organizing scheme came through. Imagine if single notes (and rests) were selected from various compositions and strung together *at random*. The resulting music would not reflect what each note was leading towards. This is a peculiar relationship, where the individual notes are somewhat arbitrary out of context, but are essential building blocks in creating a context.

In *You've Got Bugs!* (2006), the conversation is similar (Fig. 12.3). The screen depicts a closed-circuit video of the space in front of the screen, which includes the audience member. The scene is somewhat distorted and discolored but easily recognizable. One may wonder why this particular unappealing effect has been applied. The answer appears. Small virtual insects then crawl onto the scene. The audience member does not know at first, but the insects are crawling toward points of motion. Thus wherever the observer moves, the bugs follow. In the course of discovering what is happening on the screen, the audience member must behave in ways that the gallery setting would not predict. In fact, without this explanation, it would be rather unclear as to why the gallery visitor is ducking and swaying. This unpredictable behavior is rather conspicuous.

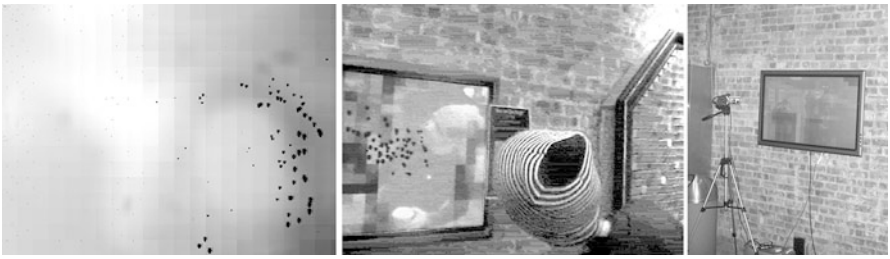

Fig. 12.3 *You've Got Bugs!* Screen shot and picture of installation with and without audience member

12.4 Conclusions

We must now consider why evolution bothered to favor the ability for beat detection? Firstly, whatever their authors' intention, mythologies are strategies used for culturally informed development. Any culture will do, none are intrinsically more or less ideal. This includes both traditional cultures, as well as ones invented in the course of a game. Nonetheless, we come to learn which patterns in the environment are significant to other members of that select culture. Ritual teaches us which artifacts to be revered, and in what ways reverence is shown. Symbiotically, the mythologist/artist, having assimilated the priorities of a given culture, arranges words and concepts into an explanation for these prioritized experiences. Random sounds may be heard by the audience member, but the mythologist-as-musician having arranged several of these sounds into a rhythm, provides the audience member with a means by which to discern meaning from chaos. The audience member can now exhibit solidarity with the culture by dancing, tapping or otherwise demonstrating the successful application of cultural cues, as appropriate given these cultural rules. For instance, one might move vigorously at a club in response to music, but is expected to sit still when hearing "Here Comes the Bride."

Likewise, the painter may be drawn to the medium of paint, due to some personal *intelligence*, and is provided with tools to embody some otherwise un-articulate-able problem. There is no possibility that an inanimate tool, such as a computer, actually "curates" the problem-solving task at hand, creating the mythology. In the same way, the abacus does not perform mathematics, but embodies a part of the cognitive process where limitations of the human mind are most apparent. Yet there is clearly the sensation experienced of animate behaviors and anthropomorphic personalities attributed to some events on the screen and not others. An audience member too may then be drawn by a personal intelligence to look at paintings. From the painting, that audience member culls the necessary clues to show solidarity. The essential trick, however, is that the painting is not literally an intelligent being with a message. At the cost of over-interpreting scenes on the computer, or even the printed page, we can come to submit to cultures, in instances when only scant clues as to the requirements of membership can be detected from literal, concrete sensations.

References

Ackernan J, Bargh J. Two to tango: automatic social coordination and the role of felt effort. In: Bruya B, editor. Effortless attention: a new perspective in the cognitive science of attention and action. Cambridge: MIT Press; 2010. p. 235–71.

Allen S. Finding significance. In: Finding significance, Exploratorium research series. San Francisco: Exploratorium; 2004.

Arbabi F. Classical Persian music (Radif). New York: Freydoon Arbabi/McGraw Hill; 2000.

Ash R. Information theory. Mineola: Dover; 1965.

Baron-Cohen S. Autism: the empathizing-systematizing (E-S) theory, cognitive neuroscience 1156. New York: New York Academy of Sciences; 2009.

Bavelas J, Coates A, Johnson T. Listener responses as a collaborative process: the role of gaze. J Commun. 2002;52(3):566–80.

Becker J. Deep listeners. Bloomington: Indiana University Press; 2004.

Benjamin W. Some remarks on folk art. In: The work of art in the age of its technological reproducibility and other writings on media. Cambridge: Harvard University Press; 1929.

Bjorklund D, Pellegrini A. The origins of human nature: evolutionary developmental psychology. Washington, DC: American Psychological Association; 2001.

Boyd D. Autistic social software. SuperNova conference, San Francisco; 2004. p. 35–45.

Bregman A. Auditory scene analysis. Cambridge, MA: MIT Press; 1999.

Cage J. Silence. Middletown: Wesleyan Paperback; 1961.

Campbell J. The hero with a thousand faces. Novato: New World Library; 1949.

Campbell D. The Mozart effect: tapping the power of music to heal the body, strengthen the mind, and unleash the creative spirit. New York: Avon Books; 1997.

Campbell J, Moyers B. The power of myth. New York: Doubleday; 1988.

Castelfranchi C. For a 'cognitive anatomy' of human emotions ad a mind-reading based affective interaction. In: Gökçay D, Yildirim G, editors. Affective computing and interaction: psychological, cognitive, and neuroscientific perspectives. Hershey: IGI Global; 2011. p. 110–32.

Chomsky N. Syntactic structures. Berlin: Walter Gruyter GMBH; 1957.

Chomsky N. New horizons in the study of language and mind. Cambridge: Cambridge University Press; 2000.

Clancy S. Abducted: how people come to believe they were kidnapped by aliens. Cambridge: Harvard University Press; 2005.

Coe M. Breaking the Maya code. New York: Thames and Hudson; 1999.

Cohen D. Perception and response to schemata in different cultures: Western and Arab music. In: Alderage D, Fachner J, editors. Music and altered states: consciousness, transcendence, therapy, and addictions. London: Jessica Kingsley Publishers; 2006. p. 60–73.

Crystal D. How language works: how babies babble, words change meaning and languages live or die. Woodstock: Overlook Press; 2005.

Curtis S. The joy of movement in early childhood. New York: Teachers College Press; 1992.

Dewey J. How we think. Boston: Dover; 1910.

Doidge N. The brain that changes itself. New York: Viking; 2007.

Edelman G. Mind without biology. In: Bright air, brilliant fire: on the matter of the mind. New York: Basic Books; 1992. p. 211–52.

Eliot L. What's going on in there?: how the brain and mind develop in the first five years of life. New York: Bantam Books; 1999.

Fischer J. Where is the information in animal communication? In: Menzel R, Fischer J, editors. Animal thinking: contemporary issues in comparative cognition. Cambridge: MIT Press; 2011. p. 151–62.

Gardner H. Frames of mind: the theory of multiple intelligences. New York: Basic Books; 1983.

Glimcher P. Neuroscience, psychology, and economic behavior: the emerging field of neuroeconomics. In: Tommasi L, Peterson M, Nadel L, editors. Cognitive biology: evolutionary and developmental perspectives on mind, brain, and behavior. Cambridge: MIT Press; 2009. p. 261–78.

Gold L. Music in Bali. New York: Oxford University Press; 2005.
Hauser M. The evolution of communication. Cambridge: MIT Press; 1998.
Heider F, Simmel A. An experimental study of human behavior. Am J Psychol. 1944;2(57): 243–59.
Hoffman D. Visual intelligence: how we create what we see. New York: Norton; 1998.
Horzyk A, Tadeusiewicz R. Comparison of plasticity of self-optimizing neural networks and natural neural networks. In: Míra J, Álvarez J. editors. Mechanisms, symbols, and models underlying cognition, first international conference on the interplay between natural and artificial computation, Universidad Nacional de Educatión a Disrancia, De Ingenería Informática, Departmento de Inteligencia Artificial 3561. Berlin: Springer; 2005. p. 156–65.
Humphrey T, Gutwill J. Fostering active prolonged engagement. In: Fostering active prolonged engagement, Exploratorium research series. San Francisco: Exploratorium; 2005.
Joseph B. Random order: Robert Rauschenberg and the Neo-Avant-Garde. Cambridge: MIT Press; 2003.
Jourdain R. Music, the brain, and ecstasy: how music captures our imagination. New York: Harper Collins; 1997.
Jung C. The concept of the collective unconscious. In: St Bartholomew's journal, reprinted in The Portable Jung. Penguin: New York; 1935. p. 59–69.
Kartomi M. Musical strata in Sumatra, Java, and Bali. In: May E, editor. Music of many cultures. Los Angeles: University of California Press; 1980. p. 111–33.
Knapp M, Hall J. Nonverbal communication in human interaction. Belmont: Thompson Higher Education; 2006.
Koch C, Tononi G. A test for consciousness. Sci Am. 2011;6(304):44–7.
Kohn A. Education and democracy today, progressive education. Nat Assoc Indep Sch. 2008;Spring:1–7.
Lakoff G, Johnson M. Metaphors we live by. Chicago: The University of Chicago Press; 1980.
Lerdahl F, Jackendoff R. A generative theory of tonal music. Cambridge: MIT Press; 1983.
Levitin D. This is your brain on music. New York: Penguin; 2006.
Licklider J. Man-computer symbiosis. IRE Trans Hum Fact Electron. 1960; HFE-1: 4–11.
Millikan R. Pushmi-pullyu representations. In: Nuccetelli S, Seay G, editors. Philosophy of language: central topics. Plymouth: Rowman and Littlefield Publishers, Inc.; 1995. p. 363–76.
Morrow R. Sesame street and the reform of children's television. Baltimore: The Johns Hopkins University Press; 2006.
Nissan N, Schocken S. The elements of computing systems: building a modern computer from first principles. Cambridge: MIT Press; 2005.
Patel A. Music, language, and the brain. New York: Oxford University Press; 2008.
Phillips D, Soltis J. Perspectives on learning. New York: Teachers College Press; 2009.
Piaget J. The child's conception of the world. New York: Rowman & Littlefield Publishers, Inc.; 1929.
Piaget J. Play, dreams, and imitation in childhood. New York: W.W. Norton & Co.; 1962.
Piaget J. Genetic epistemology. New York: W.W. Norton & Co.; 1971.
Reeves B, Nass C. The media equation: how people treat computers, television, and new media like real people and places. Cambridge: Cambridge University Press; 1996.
Schmeichal B, Baumeister R. Effortful attention control. In: Bruya B, editor. Effortless attention: a new perspective in the cognitive science of attention and action. Cambridge: MIT Press; 2010. p. 29–50.
Searle J. Rationality in action. Cambridge: MIT Press; 2001.
Sfard A. Thinking as communicating: human development, the growth of discourse, and mathemetizing. New York: Cambridge University Press; 2008.
Shanahan M. Solving the frame problem: a mathematical investigation of the common sense law of inertia. Cambridge: MIT Press; 1997.
Shannon C, Weaver W. The mathematical theory of communication. Chicago: University of Illinois Press; 1949.

Solso R. The psychology of art and the evolution of the conscious brain. Cambridge: MIT Press; 2003.
Sporns O. Networks of the brain. Cambridge: MIT Press; 2011.
Tough P. How children succeed: grit, curiosity, and the hidden power of character. New York: Houghton Mifflin Publishers; 2012.
von Neumann J, Morgenstern O. The theory of games and economic behavior. Princeton: Princeton University Press; 1944.
Vygotsky L. Mind in society: the development of higher psychological processes. Cambridge: Harvard University Press; 1978.
Vygotsky L. Thought and language. Cambridge: MIT Press; 1986.
Wiener N. Problems of sensory prosthesis. In: Selected papers of Norbert Wiener. Cambridge: MIT Press; 1950. p. 431–9.
Wiener J, Shettleworth S, Bingman V, Cheng K, Healy S, Jacobs L, Jeffrey K, Mallot H, Menzel R, Newcombe N. Animal navigation: a synthesis. In: Menzell R, Fitscher J, editors. Animal thinking: contemporary issues in comparative cognition. Cambridge: MIT Press; 2011. p. 51–76.
Wright J. Neuroacoustics: integrating the strengths of computer technology and human biology through music, Sonic Ideas/Ideas Sónicas 1(3). The Mexican Center for Music and Sonic Arts; 2010.
Wright J. Interaction's role as catalyst of synthesized intelligence in art. In: Aceti L, Jefferies J, Papadimitriou I (vol. editors) Munro J, Sahin O, editors. Leonardo Electronic Almanac, Publications: Touch and Go (18)3; 2012a. p. 190–99. Leonardo.
Wright J. Borrowed intelligence: observing and implementing the culture of the art world. In: Accolas S, Wanono N, editors. Paris: Création and transmission en Anthropologie Visuelle. Journal des Anthropologues December, AFA (French Association of Anthropologists); 2012b. p. 130–31.
Wright J. Discovering the non-self: the construction of language, trance, and space. In: Broadhurst S, editor. Body Space Technol J. 2013a;2(11):1–12.
Wright J. Can you tell me how to get, how to get to e-learning: development and complexity. In: Eletti V, editors. J e-Learn Knowl Complex. 2013b;3(9):41–53.
Zonis E. Classical Iranian music. In: May E, editor. Music of many cultures. Los Angeles: University of California Press; 1980. p. 269–83.

Chapter 13
Augmenting Wilderness: Points of Interest in Pre-connected Worlds

Nathan Shafer

13.1 Introduction

Figure 13.1 is a QR code for this chapter, which will launch a channel called "Augmenting Wilderness" when scanned using the Junaio mobile AR application, so that the reader can hear some of the audio tracks embedded in this essay, or follow some links to cited works. This chapter also makes the same work available on an identical channel, on the Layar mobile app. Augmented reality art is gaining common relevance by recuperating into this type of commercially viable interactive print, which is based on targets instead of geolocation. It is easier to monetize and advertise with. AR in contemporary usage, however, remains an intrinsically global and viscous practice, whether it is functioning in this sort of consumerist enterprise or if it is a radical intervention of everyday life.

This chapter is going to look at a few projects that have constructed AR works in the worldwide public sphere—works steeped in the anti-tradition, practicing a flat ontology and presented on the borders of an increasingly connected world. They are unseen hubs in a worldwide social network; temporally localized, globally mobile—multiplicitous points of interest in the wilderness.

I am Sitting in a Room was produced in 1969, one of the earliest compositions to incorporate electromagnectic tape and feedback (Fig. 13.2). The piece takes Lucier's recorded voice and records the playback of it in a room, where the room itself restructures the work into ambient static, ultimately getting rid of Lucier's stutter and creating a resonant frequency.

Today Lucier's work is an early representation of the way artists can intertwine digital media and physical location to develop mobile augmentations in the world.

N. Shafer (✉)
Founder, Institute for Speculative Media, University of Alaska Anchorage, Honors College, Complex Systems, Anchorage School District, Structured Learning, AK, USA
e-mail: shafernathan@yahoo.com; http://www.nathanshafer.org

V. Geroimenko (ed.), *Augmented Reality Art: From an Emerging Technology to a Novel Creative Medium*, Springer Series on Cultural Computing,
DOI 10.1007/978-3-319-06203-7_13,

Fig. 13.1 QR code for "Augmenting Wilderness"

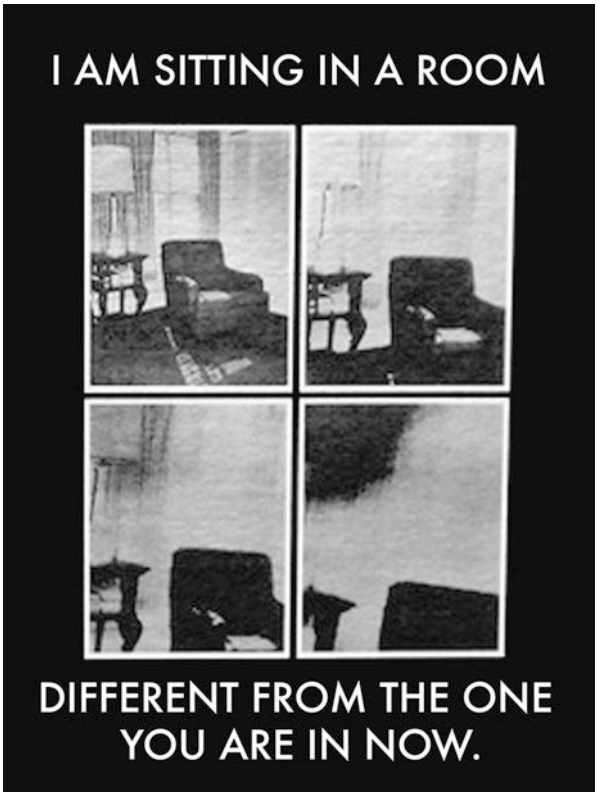

Fig. 13.2 I am sitting in a room by Alvin Lucier (1969), audio, 15:23 (All rights courtesy of the artist, image source: Nathan Shafer in the Creative Commons)

'Room' is a global work, that can be accessed or recreated anywhere one takes recording equipment. When it was originally conceived, it came with a set of instructions on how to recreate the work hyperlocally, in one's own room. Participants started with the original recording of Lucier speaking and played it in a room, rerecording it, over and over until it becomes ambient static, shaped by the space they are temporally in.

13.2 AR, OOO

Augmenting wilderness is a practice in augmented reality art making—the process of enmeshing digital objects with pre-connected worlds. *Pre-connection* references the absence of wireless fidelity (Wi-Fi) within an ecosystem or community, but not the effects of it, which are evident in its local manifestations and are ubiquitous in the augmented object's realm of attraction. Pre-connection precludes the idea that eventually the entire world will be universally connected to the Internet, so it is a temporal descriptor, albeit based on a very optimistic prediction about the future of technological ubiquity. Pre-connection is going to be a contemporary, temporal condition of some areas on the planet, where either a lack of human population or environmental factors, keep the space signal from integrating with the local media ecosystem via ambient radio waves (Wi-Fi). Radio waves, satellite signals and space weather are part of the nonlocal intermedia landscape of human mobility from global to interplanetary, but presently are Anakin to the *social wilderness*, a wilderness completely outside of human construct or perception.

The use of the term *wilderness* in relation to AR adopts Levi Bryant's *wilderness onticology*, "(it) should not be conceived as the absence of humans, but rather in terms of a flat plane of being where humans are among beings without any unilateral, overdetermining role . . . humans dwell in wilderness without the wilderness being reduced to a correlate of thought," (Bryant 2011) looking at the wilderness as a multiplicitous 'difference engine', in the context of object-oriented ontology (OOO), an aesthetic philosophy of being that takes the perceived reality of objects out of Kant's *Copernican Revolution*, which predicates the existence of objects on the human-world correlate of them (Kant 1781). Defining wilderness, for the sake of augmented reality as an artistic practice, is more a discussion than definition, as Oeschlaeger notes, "the issue involves the *theorie* upon which *praxis* will rest—the idea of wilderness itself. Whatever this idea, the conceptual difference will be reflected in practice" (Oeschlaeger 1991).

Certain theoretical aspects of augmented reality artistic collectivism are ecologically parallel to OOO, especially the metaphysical nature of the AR 'art-object', which focuses "on the informational relationship between object and human viewer, or the political and economical context surrounding the artwork's reception" (Jackson 2011). OOO emerged at around the same time as mobile AR collectivism (2009–2010), so it is no surprise that there are similarities due to their temporal proximity: there are issues of critical reception for both groups because of their incorporation of non-traditional platforms like social networks and blogging—both groups are also academically suspect in many circles, (OOO is unconcerned with the Analytic vs. Continental beef, and AR is equally unconcerned with Modernism vs. Post-Modernism).

Early critical issues concerning augmented reality as an emergent art form are described as the "antiquated VR pipe dreams" via the new media blog, Rhizome.org, taken from fictional depictions of AR and the use of the 'web browser' as an artistic metaphor. The 'VR pipe dreams', which William Gibson fictionalized in his 2007

novel *Spook Country*, as "cartographic attributes of the invisible", or "spatially tagged hypermedia," (Gibson 2007) are what viewers are truly expecting to see when they first experience AR. Augmented wilderness, then, is a good place as any to examine the basic instability of contemporary AR, in contrast to a virtual fantasy world overlaid on top of our collective expectations of it as an artistic medium. AR is a 'specialized' sub-set of the global media ecosystem, what Ian Bogost describes as a *microhabitat* (in terms of media ecology) with the value of the specialized media being "less important than the documentation of its variety and application" (Bogost 2011). Like the health of a biological habitat—media ecologies measure their health in variety and application.

13.3 POIs

Singular augmented reality pieces, commonly referred to as points of interest (POIs), are augmented objects in a world of other equivalent objects, where humans are just one group of beings. Like other objects, or works of art, these POIs are not existentially contingent on human cognition—their being and their properties are different things. T.S. Elliott's *objective correlate* is viable for many artists working in the modernist or postmodernist traditions, but it is inconsequential when discussing the formal characteristics of AR artworks without their existences sharing an equal ontological footing with their properties or physical attributes. The function of juxtaposing AR and OOO, is not to elucidate or explain formalist aesthetic philosophies, or to open a critical inquiry into any particular works given status as art, object/subject, or object/thing; but to illustrate how augmented reality art performs, when looked at in a flat ontology, in spite of Kant's correlate, a dated, homocentric view of the universe that is counter-intuitive to our current worldview, where kids grow up knowing that things happen on exoplanets, like Gliese 436 b, a water planet the size of Neptune covered with 'hot ice' (Gillon et al. 2007). Or that there are diamond volcanoes on hot carbon planets that have surface landscapes of duning pencil lead (Clark 2012). These amazing aspects of the literal wilderness in the known universe—do not need human observation to exist, we can guess at their existence mathematically or theoretically, but the literal local manifestations of the objects themselves, these difference engines, are fine without us being physically present and observing them, especially since the practice of our observation is changing.

By now the thing of AR has become second nature to us—people wandering about; staring at the world through little glowing screens, looking for POIs—is commonplace, even treated with speculative disdain by an older generation, who see smart phones as brain-eating mobile pacifiers, working to devolve our sapience. As a process, mobile media observes the human aesthetic experience, enmeshing objects in the world, what Timothy Morton, refers to as, the *aesthetic dimension*.

"(It) is the causal dimension, which in turn means that it has the vast nonlocal mesh that floats "in front of" objects (ontologically, not "physically" in front of them)" (Morton 2013).

AR is a new art medium, literally and physically operating in the nonlocal causal mesh Morton elucidates. At the present moment, AR has two different ways of being, or documented varieties: by attaching augments to a target (something that is scanned by a computer, generating an AR object, or POI), or by attaching augments to a geolocation (your computer knows where it is on Earth, which generates an AR object/POI). Currently, most developers and artists are using AR browsers, which are proprietary mobile applications for smart devices.

13.4 Radio Babies

Before looking at some specific AR art projects, which illustrate a flat ontology in the wilderness—Fig. 13.3 is an artwork by George Ahgupuk, called *Radio Babies* from 1940. It is ink and watercolor on bleached animal skin, with a stitched red sinew border. The image drawn on the skin depicts a fully clothed newborn flying

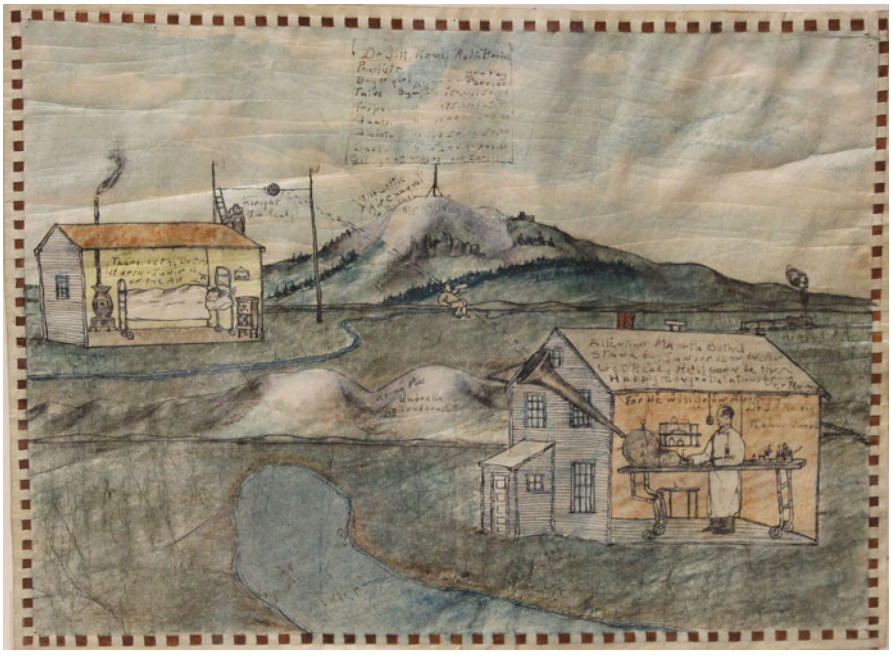

Fig. 13.3 Radio babies by George Ahgupuk (1940), ink and watercolor on skin (Photo: Anchorage Museum at the Rasmuson Center)

from the bell horn of a radio, through the air, across the unseen ether all around us, to an Iñupiat family with a radio antenna at their cabin many miles away in Bethel. The white man at the bell horn is Joseph Romig, an early doctor in territorial Alaska. He would help aid in deliveries via radio, a proto-telephonic version of action at a distance. Early telemedicine. *Radio Babies* shows an immediate technological connection between remote locations (pre-connected worlds), and the way information exists in an ecosystem as part of the human experience inside of it. One of the notable elements of the work is Ahgupuk's ability to take a technological marvel (radio communication), being used for good (family medicine) and illustrate it with a pronounced bit of magical realism (the baby flying on radio waves) personifying nonlocal action via technology.

Another poetic illustration of technology in *Radio Babies* is the gigantic see-through reel-to-reel screen on top of Mt. McKinley in the background, titled the 'J.H. Romig Radio Babies Pricelist', showing what people can expect to pay for family telemedicine services, boys and girls start out at $200, with discount prices for a twin, and notable discounts for triplets and quadruplets. Ahgupuk's written words in the painting are as much a part of the environment as the images of buildings and mountains, with the words "Umbrella Roadhouse" and "Rainy Pass" geolocated on their watercolor locations. *Radio Babies* practices a flat ontology where the ambient information in a place is equivalent to the other objects in it, without losing the complex humanness that is so apparent in the artistic depiction of the technology (the pricelist and the healthy family are both effected by the radio communicator). *Radio Babies* is a nonlocal networked media piece, made with locally available (and traditional) materials, which also places it firmly in the canon of Alaskan art history.

13.5 Anti-tradition

In 1996, when Nicholas Negroponte was looking at the future of digital media art from the beginnings of the MIT MediaLab, he wrote, "the digital superhighway will turn finished and unalterable art into a thing of the past. The number of mustaches given to Mona Lisa is just child's play" (Negroponte 1996). He was mentioning Duchamp's *ready-mades* tangentially, but more importantly, he invoked a spirit many artists refer to as the *anti-tradition*, which has been part of the networked or digital aesthetic since its inception. The anti-tradition isn't an art movement, but rather a variegated practice of producing counter-culture art, which has been going on for a very long time, from Bouzingo to Pussy Riot. The Canadian poet Christian Bök places the historical onus of the anti-tradition on the *'pataphysical* literature of Alfred Jarry (Bök 2002) whose major literary influence was the drunken dithyrambic fantasies of François Rabelais, a writer from the European Renaissance. Negroponte's enthusiasm for a society full of malleable cultural objects has been given a new technological tool for the anti-tradition with the advent of the 'digital superhighway'.

Regardless of when and where the anti-tradition emerged, its various practices and applications have usually aligned with revolutionary or countercultural political movements of the day—for example, members of the Situationist International were in the Latin Quarter during the 1968 riots in Paris and members of the Provo Group hijacked a balcony in the Vatican delivering an anti-religious Easter sermon before they were arrested. What is important to note is how works from the anti-tradition are quintessentially *of the time,* with each socially useful or relevant form these artists took to counter the dubious cultural dialectics of their time. As Gregory Sholette wrote, "If socially useful art is ultimately determined by the society it serves, the artist as tool maker must, by necessity, look to the public sphere, and not to the realm of art, for the logic of her work" (Sholette et al. 2004).

Apart from the anti-tradition, AR art has ancestors in Earth art and conceptualism; roots in Fluxus, punk rock, the Situationist International, Fin-de-siècle literature, cyberpunk and 1990s style Interventionism. It cut its teeth with the twenty-first century's international Occupy movements. The Manifest.AR manifesto, from early 2011, posits that AR artists "create subliminal, aesthetic and political AR provocations, triggering Techno-Disturbances in the substratosphere of Online and Offline Experiences . . . Augmented reality is a new Form of Art, but it is Anti-Art . . . It is a Relational Conceptual art that Self-Actualizes" (Manifest.AR 2011). Since its inception, Manifest.AR has consistently produced collaborative projects from the public sphere, which have integrated with social movements and revolutions across the globe.

13.6 Usage

When AR browsers became available as mobile applications, it was a *memetic* shift in the usage of AR, from the preconscious imaginings in sci-fi novels with headsets and cyberpunks—to the one from quotidian existence where tourists hold up mobile phones in shopping arcades. Initially, the works of art produced inside of this new usage of AR seemed like they would be a combination of locative media and digital sculpture, which by and large they are, but it has been adapting to the common usage in society. Gibson described the locative artist as "annotating every centimeter of a place, of every physical thing. Visible to all, on devices . . ." (Gibson 2007). The 'device' referred to is the artist's mobile phone; which is not the preferred method for viewing 'locative media' in *Spook Country* (VR headsets are), the artist's mobile phone was a second best—an ad hoc example, put together to illustrate the important locative work the fictional artist made for VR helmets.

Just because an object has certain properties or features, does not preclude that they will be used, or used in the way they were intended. As Sheller notes, "Unlike commercial applications, artists often draw on more disruptive and critical traditions that seek to defamiliarize the familiar, or to heighten our sensual awareness of location, or to offer new forms of place making and public engagement" (Sheller 2013). With the myriad of commercially available AR glasses, on the verge of

redefining AR, we should think of those 'VR pipe dreams', which were disregarded for the use of less encapsulating smart phones, and then reinvented again, as a more transitional and ubiquitous form between VR helmet and phone, and know that artists are going to misuse Google Glass, or whatever the object in common usage is . . . eventually.

The unintended usage of objects being spread from local application to application—is part of the nature of memetic reproduction and variation, and is the way networked media aesthetics create niches in media ecologies. As biologist Richard Dawkins, who coined the term *meme*, explains, "Just as genes propagate themselves in the gene pool by leaping from body to body via sperm and eggs, so memes propagate themselves in the meme pool by leaping from brain to brain via a process, which in the broad sense, can be called imitation." (Dawkins 1976) This imitation of usage is evident in the way some youths are smashing the screens of their smart phones, in a stylish sort of identity protestation, like the torn jeans of the 1980s (Wax 2013), "a new meme will have a greater chance of penetrating the meme pool if it is consistent with other memes in that environment" (Distin 2005).

The anti-tradition political-aesthetic practices of the Situationist International gained a newfound relevance when Internet browsers became a widely used format. *Psychogeography* is one of these object-practices from SI, it is a way of participating in the world based on the human situation within it, or developing an aesthetic that mitigates between the unseen history of the immediate environment or the psychic artifacts left in our ecosystems, (this connection between Situationist *praxis* and locative media was referenced in *Spook Country* as well). OOO refers to these objects as reflexive objects. Or in Foucault's pre-OOO observation, "a form of reflection . . . that involves for the first time, man's being in that dimension where thought addresses unthought and articulates itself upon it" (Foucault 1970).

Geolocative AR is still currently in the public sphere, free for anyone to access, and no permits needed to put a POI in a secure location, as with Sander Veenhof and Mark Skwarek's collaborative work from 2010, *infltr.AR* (Fig. 13.4), which put virtual hot air balloons porting Twitter feeds from the outside world into the White House and the Pentagon. Essentially, the White House and the Pentagon are part of the public wilderness that viewers can see from an enclosure and take pictures of. Just like tourists on a road trip through the Midwest US, it is a true point of interest, in its original context, part of the American Landscape, made for visitor locations, or great places for an anamnestic photograph. Secured government facilities are not wildernesses that are protected per se, but definitely objects that are actively being preserved, and left relatively unknown to the normal citizenry.

Both augmented reality and the wilderness are difference engines, which create entanglements in communities; they are also object-ideas that are not anywhere in particular. They are 'viscous' global objects, like the Internet and the World Wide Web. Morton refers to these sort of global objects that are both 'nonlocal' and 'viscous' as *hyperobjects*. One of his key examples is global warming. It is an object that cannot be reduced to a singular object one can touch—a happening and concept in the world that has visible effects and consequences, which can work to

Fig. 13.4 infltr.AR by Mark Skwarek and Sander Veenhof (2010), AR intervention at White House and Pentagon using Twitter (Photos: Sander Veenhof)

illustrate it. With global CO2 at over 400 parts per million, global warming can be seen in extreme weather in the cities on the eastern seaboard, or in Alaska, with glacial retreat.

13.7 Anamnesis

Figure 13.5 is an AR work of mine, built on site, 120 miles from Anchorage in Kenai Fjords National Park, the *Exit Glacier Terminus Project.* Exit Glacier is a glacial extension from the Harding Ice Field and derived its name because it was the glacier from which the first white explorers to travel the area used to exit the ice field. It has been in dramatic decline for a several decades now, and has shrunk to quite a small size, compared to its former self, a physical manifestation of both the hyperobject called global warming and another hyperobject called the cryosphere (the sphere of frozen water on the surface of the Earth).

Fig. 13.5 Exit Glacier Terminus Project (2001 Terminus) by Nathan Shafer (2013), five different AR versions of glacial termini where built on location at Exit Glacier, this is the terminus from the year 2001 (Source: Nathan Shafer)

Exit Glacier is one of a very small number of glaciers in the world that are easily accessible from a highway. The US National Park Service has been aggressive in its work to illustrate global warming at this glacier. The AR project digitally reconstructs five of the former termini on location in Kenai Fjords National Park, based wholly on the glacier itself as a reflexive object: 2001 (year of 9/11), 1994 (Mosaic, the first popular web browser), 1979 (the artist's birth year), 1964 (Good Friday Earthquake in Southcentral Alaska) and 1953 (The Wild One, starring Marlon Brando). These years were selected for their connection to the variety of human experience, relatable to the timeframe of the glacier, setting up an anamnesis of the viewer's environment, projecting their memories and experiences onto the augments that are points of interest at the glacier. There is a viscous collective knowledge intrinsic to the human condition in viewing mediated wilderness, which is activated by language.

Exit Glacier also encapsulates one of the continuous multiplicities for the event of augmenting wilderness, the bits of code needed to make geolocation-based AR work on site. On contemporary mobile devices the necessary elements, which must be active are the compass, gyroscope, accelerometer, GPS and Internet connectivity. Internet connectivity is the wild card is the group. GPS is usually faster than Wi-Fi and universally accessible on mobile computers, though Alaska's latitude on the planet can create dead zones in valleys or mountains. The radio waves needed

to create wireless fidelity get distorted in the wildernesses of the Earth, as do the signals from GPS satellites. The basic write-around is downloading the entire augment before walking out of cell-range into a pre-connected world, and hope that the GPS stays relative. This is not optimal and incredibly Unstable. A portable Wi-Fi signal must be brought into the pre-connected wilderness, like an iron lung, for AR to keep breathing on site.

This is one of the banes of the site-specificity for works of AR art. The *Exit Glacier Terminus Project* is built on-location. To experience the piece, viewers must drive to Seward, Alaska, and go through the entire process of loading the application and layer on their devices, then carry a Wi-Fi hotspot out to the site with them. Once there, the ebb and flow of the GPS causes the piece to move as you are standing still viewing it. This is not unlike problems Earth Art faced. It is a problem of being, the existence of the work itself, without even getting into the meaning or quality of the work. Few people literally went out to view Robert Smithson's work in situ to evaluate it in person, or meditate at it, or whatever viewers do when they view a work of art. One of the concerns here is that documentation of the work becomes a keen feature in the process of viewing it, since that is precisely how most viewers will experience it. It involves a certain sense of wandering and tenacity to get to a geocoded POI in person, albeit one more in line with the nineteenth century notion of the *flânuer* in the city, since metropolitan areas are where POIs tend to be most stable. Benjamin wrote, "the anamnestic intoxication in which the flânuer goes about the city not only feeds on the sensory data taking shape before his eyes but often posses itself of abstract knowledge—indeed, of dead facts—as something experienced and lived through" (Benjamin 1982). In rural Alaska, the flânuer is akin to naturalists like John Muir, walking the city streets and National Parks, seeing new landscapes by virtue of the same 'anamnestic intoxication' for the natural world as the flânuer, sort of fascinated and cool at the same time, constantly seeking out new points of interest. Hoy has written that, "AR technology encourages a praxis-based approach to spatial knowledge. Its incorporation of mobile computing means that the body is activated in a process of movement and spatial exploration" (Hoy 2013). The 'anamnestic intoxication' would be the theoretical body knowledge and inherited collective memory, flooding the viewer on location.

The fact that mobile AR must be viewed through a mediator (smart device) lends itself to a global aesthetic usage. When most AR works are viewed, they can be captured via screen grabs or photos as they actually are. Reproductions of these works can be more artistically mannered, or through proper documentation, have a higher resolution than viewing on site. It is a portion of the human aesthetic that gets disturbed, the way we are intrinsically linked to the places we are at. Breathing on site, or observing a cloud pass in front of the sun, as the POIs stay digitally backlit, seemingly unaware of the solidity of the objects in the environment in which they are placed. The issue that remains for site-specific AR, and one that becomes important for the global audience is how to experience a large-scale geolocation-based AR work, without having to travel there.

13.8 Variety and Application

Earth art experienced a similar problem in display, but Smithson's praxis of the *site/non-site* provides a way of adapting to the presentation of AR artworks in formal situations. An earthwork created on site in the mountains is visible to the few who get out there and see it, the GPS-equipped hiker, or tech-savvy flânuer. This is the *site* of the work of art, and it is the same format as a geolocation-based AR piece, like 'Exit Glacier'. When the work is displayed in a gallery or museum, Earth artists would make an indoor earthwork, which they called a *non-site*. As Smithson states in *A Provisional Theory of Non-Sites*, "(it) is a three dimensional logical picture that is abstract, yet it represents an actual site . . . to understand this language of sites is to appreciate the metaphor between the syntactical construct and the complex of idea" (Smithson 1996). A non-site equivalent in AR works is the target-based POI, which locates a work with a displayable target. Ultimately, when AR develops significant collectorship with dealers it will most likely be a target-based enterprise, with AR artists committing their extra energies to developing large geolocation-based works as their flagship projects, that are not for sale. The thing about site-specific AR however, is that no matter how intrinsically or technically the POI is tied to a literal geo-coordinate, the POI is digital, and it can be in a 1,000 places at once, this is part of its regime of attraction; POIs are digital objects that overlay our mediated experiences of the world. AR is by nature, a nonlocal being and a global medium. It is pleasantly unstable and bound to the Earth the way vampires are bound to the moon.

Borealises (Fig. 13.6) is a collaborative work between Christopher Manzione's Virtual Public Art Project (VPAP) and myself, and was included in a Manifest.AR group show called *Bushwick: AR Intervention*. It was originally conceived as an AR version of the northern lights to be displayed over Anchorage, which has horrible light pollution in the winter. The northern lights are rarely seen from within the city during our long dark months. AR browsers provided a way to see the borealises on mobile devices when the light pollution obfuscates them. With the global, multiplicitous nature of AR, the original animated POI went up in Bushwick, as part of the group show, at the same time it went up in Anchorage.

Geolocation doesn't have to be in a singular altitude, latitude and longitude (the geo-code). Putting POIs up in an AR browser is like putting a blog post up on a website (third-party platforms). The direct observation of the work does not have to be on-site, and it rarely is. Gail Rubini and Conrad Gleber, of v1b3 (Video in the Built Environment), made *NEWzzzzz* (Fig. 13.7) as part of the annual *Wintermoot Mixed Reality Festival* (Fig. 13.8) in Anchorage, held during Fur Rendezvous, a festival held around the Iditarod sled dog race, at the close of winter in Alaska.

NEWzzzzz is a scrolling feed of red letters comprised of various headlines from newspapers in rural Alaska. It is relative geolayer, that is, it is visible to anyone who opens the layer, wherever they are, because it is geo-coded to be exactly where the mobile device connecting to the layer is. Location is the target.

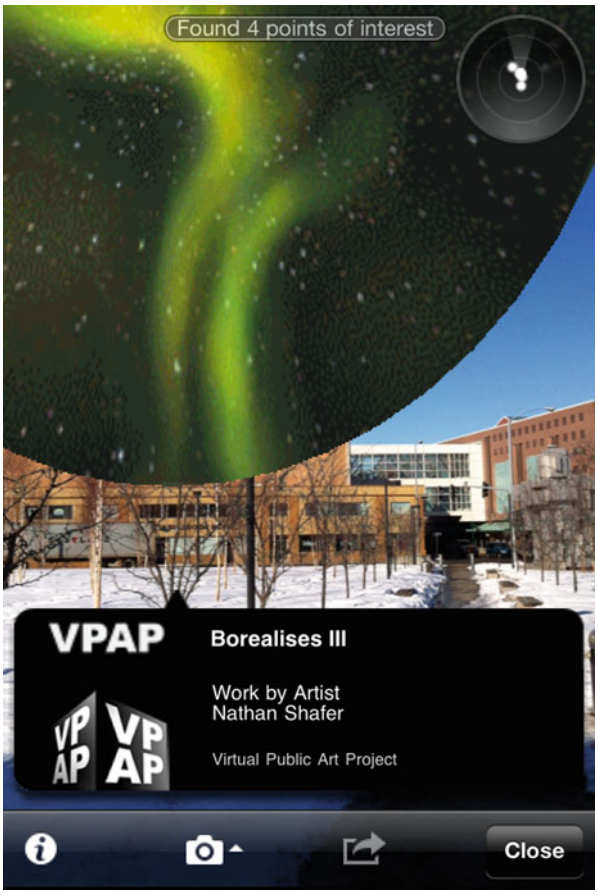

Fig. 13.6 Borealises III by Nathan Shafer and the Virtual Public Art Project (2011), digital/animated AR version of the northern lights, displayed above viewers, this screen grab comes from the first Wintermoot Festival in Anchorage, Alaska from 2010 (Photo: Jared Chandler)

V1b3 works with the printed word in many of their projects, as well as the integration of projected video in the immediate media ecosystem. *NEWzzzzz* was able to blend these two formats into a mobile application, which illustrated cultural feeds, exterior to most viewers' expectations of them, the same issue of the 'VR pipe dreams'.

Several artists in Manifest.AR have made relative AR works, Tamiko Thiel's *Reign of Gold* (Fig. 13.9) illustrates the way the global economy occupies every centimeter of our world, for example.

Non-Local (Fig. 13.10) is an on-going digital storytelling project of mine, set in a near-future Anchorage and based on the storytelling traditions of the circumpolar north, mixed with pulp science fiction and online gaming. The project is a series of short digital stories that group together as a larger narrative. In early 2013, *Non-Local* went up simultaneously in three geolayers on the Layar app in Anchorage, Seattle and Skidegate; and one target-based layer on the Junaio app in New York.

Fig. 13.7 NEWzzzzz by Gail Rubini and Conrad Gleber (2013), AR (Photo: Nathan Shafer)

The geolayers were part of a solo show at Noxious Sector in Seattle (Fig. 13.11). They all have a global filter, so the audio tracks could be heard from anywhere in the world, without having to see the local POI in person. Many of the POIs in *Non-Local* are placed in pre-connected worlds, and accessible only with the global filter running. They cannot be seen onsite, unless portable Wi-Fi is brought into the ecosystem, it was a way of attempting to make the wilderness accessible from a connected world.

The *Non-Local* augment that went up in New York was a singular audio track called *The Big Bad Broo*, which told the story of two kids who stumble onto a massive alien civilization via a confused avatar in a fictional MRPG called Cosmic Constant. The group show it was included in was by the v1b3 collective with Christopher Manzione, called *AR2View*. They took photos in a Manhattan hotel, turned the photos into targets, on which they built an AR show, brilliantly illustrating the way AR (from the aesthetic dimension) can literally lay over objects in the real world. They published this book with the target-photos, and descriptions of the

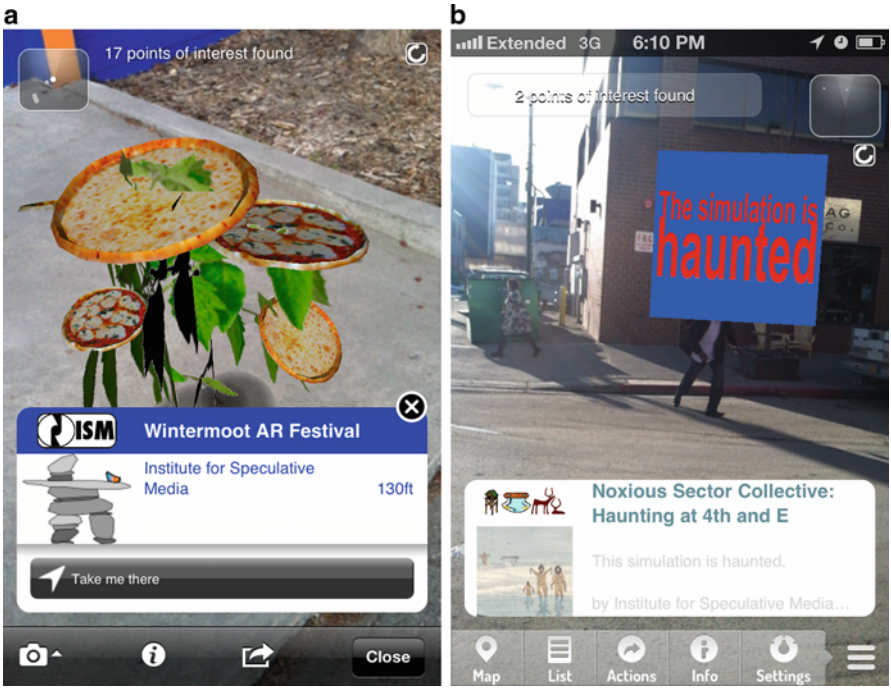

Fig. 13.8 (**a**) & (**b**) Wintermoot mixed reality festival organized by the Institute for Speculative Media, pictured in (**a**) is Mark Skwarek's congressional pizza (Photo: Nathan Shafer), (**b**) is noxious sector collective, haunting at 4th and E, (Photo: Nathan Shafer)

works. It was the second print project of three, the first, *Scan2Go*, published QR codes, which loaded artist projects. The third publication, *ART2Make*, is a series of g-codes, which can be used to 3D print the entire show of digital sculptures. Gleber has written of v1b3's use of the printed book in new media, "published books are uniquely capable of melding artist imagery with conceptual intentions, with audience curiosity and interaction in much the same way that media artists use the Internet" (Gleber 2013).

EEG AR: Things We Have Lost (Fig. 13.12) is a research/development project by John Craig Freeman and Scott Kildall, which "allows participants to conjure up virtual objects by simply imagining them into existence using brainwave sensor technology" (Freeman 2013). *EEG AR* represents a turning point in the subject matter of augmented reality art, placing more of the actual objects to be presented in the hands (or minds, in this instance) of the participants.

Creat.AR (Fig. 13.13) by Mark Skwarek et al, has a similar praxis, for allowing participants to produce personalized POIs relative to wherever they are on the planet.

The anamnesis intrinsic to both of these projects is procedural to their metaphysical being—existing to reflect the memory of something else. The databases behind both of these projects also mark an emerging method in distributed/relative AR.

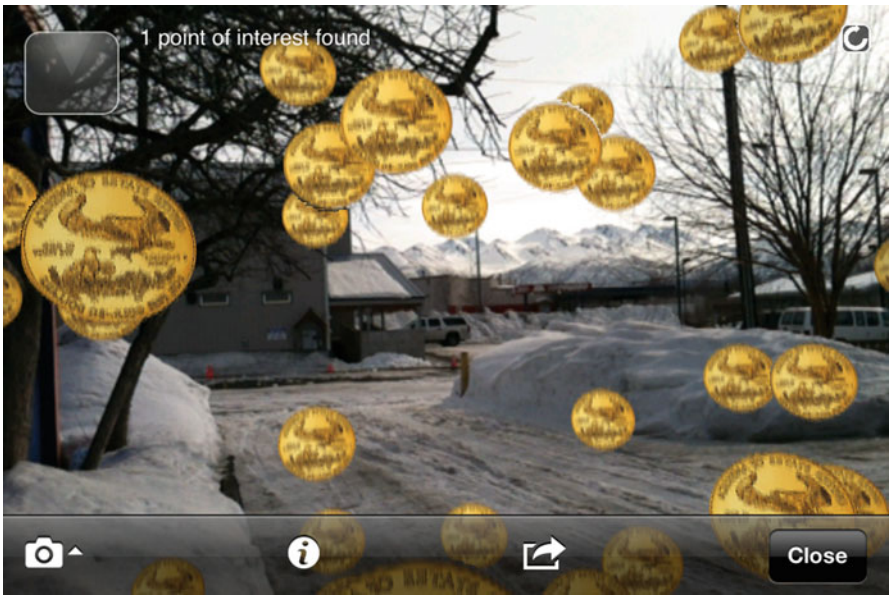

Fig. 13.9 Reign of gold, Tamiko Thiel, AR (Photo: Nathan Shafer at Out North Contemporary Art House)

Instead of just targets or geocodes, there is a relative AR, like v1b3's *NEWzzzzz*, or Thiel's *Reign of Gold*, but it is also enmeshed with the participant who has loaded the AR layer. Users are able to choose the POIs around them.

When *EEG AR* was performed as a lab/clinic at FACT in Liverpool, they ran a room where test subjects would be plugged into a brainwave sensor, which measured their brainwaves, launching an SQL sequence to create POIs from a preloaded database.

Creat.AR lets participants turn anything they want into a POI, which will appear relative to their geo-coordinates. Participants do this by typing in what they would like to see on the local layer. Then a database connected to that layer, runs an Internet search, which formats the first image to pop up for the search phrase in the mobile browser.

These two projects are viscous and nonlocal—two properties of Morton's hyperobjects. They are viscous in that, "the more you know about a hyperobject, the more entangled with it you realize you are" (Morton 2010). And nonlocal in that no participant in either project can accurately see the entirety of the work from where they are. Both works are distributed over the worldwide Wi-Fi ecosystem, which is closing in on our pre-connected spaces as we draw air. Anywhere there is a radio signal that can host an Internet connection, AR exists, whether it is manifesting locally or not.

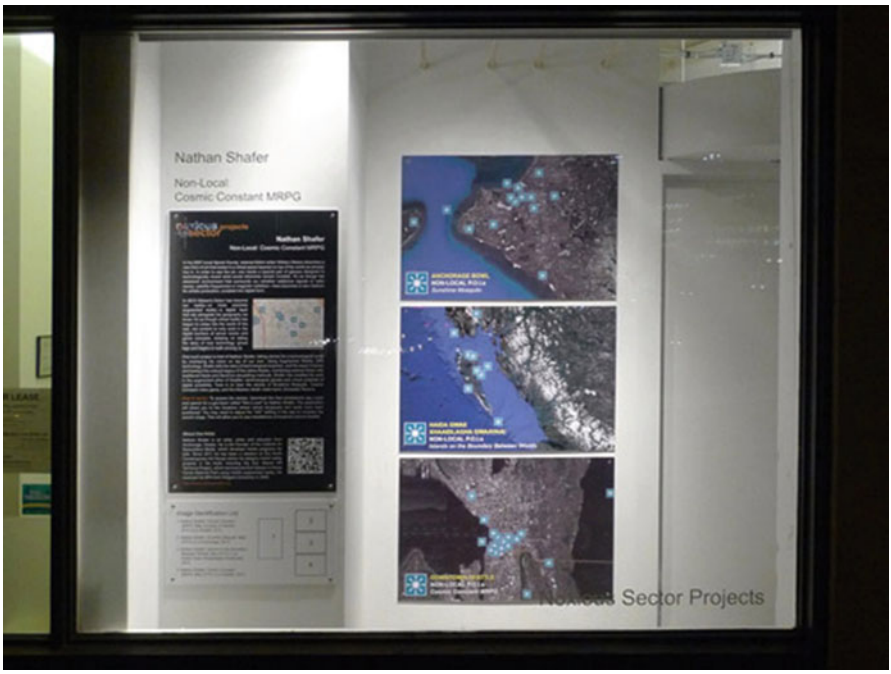

Fig. 13.10 *Non-Local: Cosmic Constant MRPG* by Nathan Shafer (2013), AR with audio at Noxious Sector Projects, Seattle, Washington, pictured is an installation shot of the show where maps of the POIs were displayed (Photo: Ted Heibert)

13.9 Praxis

The *Augmented Inuksuit Project* (Fig. 13.14) is a K-12 education based collaborative AR work in Alaska, I initiated in 2012. Inuksuit is the plural form of *inuksuk*, which are stone landmarks used by the Inuit across the circumpolar north. Inuksuit demarcated portions of the wilderness for human use, i.e. good caribou hunting or summer fish camps. With students we built collaborative inuksuit, using toy-style blocks we built in an open-source 3D modeling program—these blocks made a set, from which were built class inuksuit. Inuksuit are reflexive objects in an artistic application towards an anamnesis of the wilderness, which position the social wilderness in the literal, and are viscous difference engines in Arctic art history.

The variety and application of these objects inside of the microhabitat of AR, inside the larger media ecosystem, illustrate some of the praxis of augmenting wilderness—their usage entangled with OOO, working to decentralize the human mind as the metaphysical fulcrum upon which the existence of the cosmos hinges, making way for the equanimity for the wilderness outside of our infinitesimal pocket of the universe.

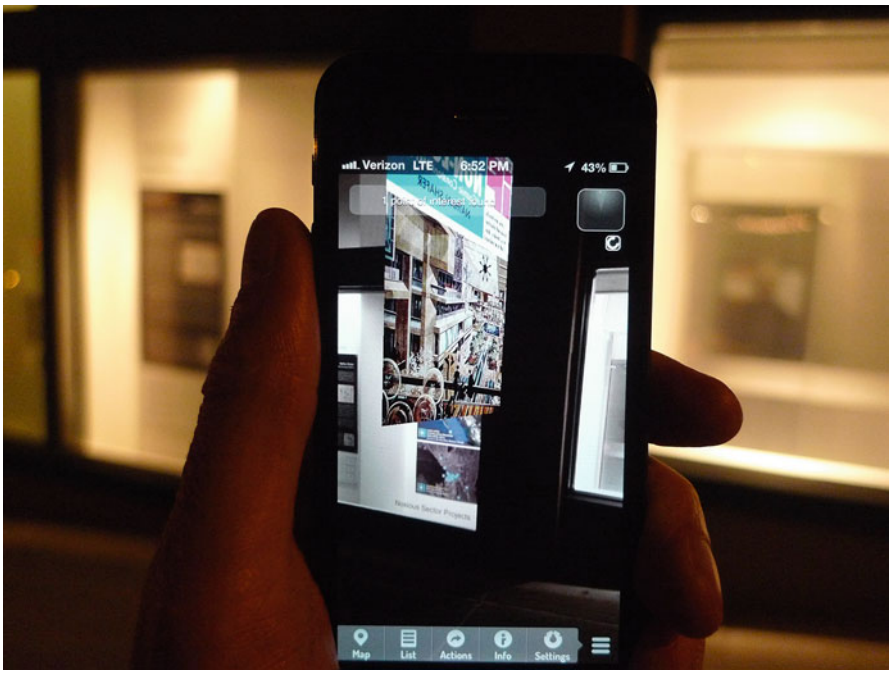

Fig. 13.11 *Non-Local: Cosmic Constant MRPG* by Nathan Shafer (2013), AR with audio at Noxious Sector Projects, Seattle, Washington, pictured is the local POI at the show, an image of the Cosmic Constant MRPG story as a pulp sci-fi publication (Photo: Ted Heibert)

Fig. 13.12 EEG AR: things we have lost by John Craig Freeman and Scott Kildall (2013), AR

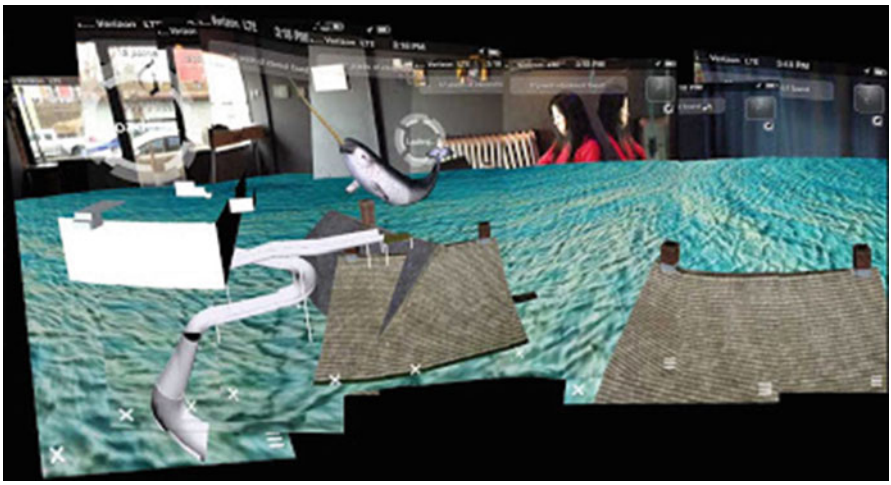

Fig. 13.13 creat.AR by Mark Skwarek et al. (2013), user-generated AR

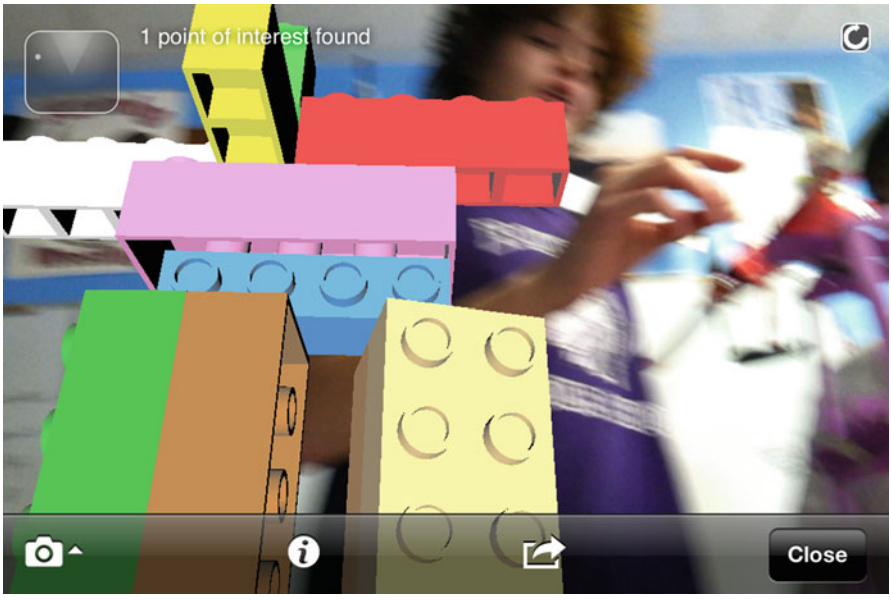

Fig. 13.14 Augmented Inuksuit Project by the Institute for Speculative Media (2012), AR, (Photo: Nathan Shafer)

References

Ahgupuk, G. Radio Babies. Ink and watercolor on skin. Anchorage: Anchorage Museum at the Rasmuson Center; 1940.
Benjamin W. The arcades project. Cambridge: Harvard University Press; 1982.
Bogost I. How to do things with videogames. Minneapolis: University of Minnesota Press; 2011. p. 7.
Bök C. Pataphysics: the poetics of an imaginary science. Evanston: Northwestern University Press; 2002.
Bryant L. Wilderness ontology. Larval subjects. http://larvalsubjects.wordpress.com/2011/06/02/wilderness-ontology/ (2011). Accessed 15 Aug 2013.
Clark L. New exoplanet is twice earth's size—and made largely of diamond. Wired UK. http://www.wired.com/wiredscience/2012/10/diamond-exoplanet/ (2012). Accessed 15 Aug 2013.
Dawkins R. The selfish gene. Oxford: Oxford University Press; 1976. p. 206.
Distin K. The selfish meme. Cambridge: Cambridge University Press ; 2005.
Foucault M. The order of things. London: Tavistock; 1970.
Freeman JC. EEG AR: things we have lost. http://johncraigfreeman.wordpress.com/eeg-ar-things-we-have-lost/ (2013). Accessed 15 Aug 2013.
Freeman J, Kildal S. EEG AR: things we have lost, Liverpool. Augmented reality; 2013.
Gibson W. Spook country. New York: G.P. Putnam's Sons; 2007. p. 22.
Gillon M et al. Detection of transits of nearby hot Neptune GJ 436 b. http://www.aanda.org/articles/aa/pdf/2007/35/aa7799-07.pdf (2007). Accessed 15 Aug 2013.
Gleber, C. (Editor). AR2View exhibition catalog. New York: College Art Association; 2013.
Hoy M (Contributor). AR2View exhibition catalog. New York: College Art Association; 2013.
Institute for Speculative Media. Wintermoot Festival. Anchorage, Augmented reality interventions; 2011–2014.
Institute for Speculative Media. Augmented Inuksuit Project, Anchorage, Augmented reality; 2012.
Jackson R. The anxiousness of objects and artworks: Michael Fried. Object-oriented ontology and aesthetic absorption. Speculations II.; 2011.
Kant I. Critique of pure reason. Penguin edn, 2007. London: Penguin Books; 1781.
Manifest AR, Manifest AR. Manifesto. http://manifestar.info (2011). Accessed 15 Aug 2013.
Morton T. Ecology without nature. http://ecologywithoutnature.blogspot.com/2010/11/hyperobjects-are-nonlocal.html (2010). Accessed 15 Aug 2013.
Morton T. Realist magic: objects, ontology, causality. Ann Arbor: Open Humanities Press; 2013.
Negroponte N. Being digital. London: Hodder & Stoughton; 1996. p. 224.
Noxious Sector Collective. Simulated Hauntings. Anchorage, Augmented reality; 2013.
Oeschlaeger M. The idea of wilderness. New Haven: Yale University Press; 1991. p. 285.
Rubini G, Gleber C. NEWzzzzz. Anchorage, Augmented reality; 2013.
Shafer N, The Virtual Public Art Project Borealises III. Anchorage: Wintermoot I, Augmented reality; 2011.
Shafer N. Exit glacier terminus project. Seward: Kenai Fjords National Park, Augmented reality; 2013.
Shafer N. Non-local cosmic constant MRPG. Seattle, Noxious Sector Projects, Augmented reality; 2013.
Sheller M (Contributor). AR2View exhibition catalog. New York: College Art Association; 2013.
Skwarek M. Congressional pizza. Anchorage, Augmented reality; 2012.
Skwarek M. Creat.AR. New York, Augmented reality; 2013.
Skwarek M, Veenhof S. infltr.AR. New York/Washington, DC, Augmented reality art intervention; 2010.
Sholette G, et al. The interventionists: user's manual for the creative disruption of everyday life. North Adams: MASS MoCA; 2004.

Smithson R. A provisional theory of non-sites. In: The collected writings of Robert Smithson. Berkeley: University of California Press; 1996. p. 364.

Wax E. Smashed smartphone screens become status symbol. Sydney Morning Herald. http://www.smh.com.au/digital-life/mobiles/smashed-smartphone-screens-become-status-symbol-20130520-2jwan.html (2013). Accessed 15 Aug 2013.

Chapter 14
An Emotional Compass: Emotions on Social Networks and a New Experience of Cities

Salvatore Iaconesi and Oriana Persico

14.1 Introduction

> The map is not the territory (Korzybski 1933).
>
> The map is not the thing mapped (Bell 1945).
>
> The tale is the map that is the territory (Gaiman 2006).
>
> We say the map is different from the territory. But what is the territory? The territory never gets in at all. [. . .] Always, the process of representation will filter it out so that the mental world is only maps of maps, ad infinitum (Bateson 1972).

When we experience territories, we create stories. We model these stories using mental maps, referring to one person's point of view perception of their own world, influenced by that person's culture, background, mood and emotional state, instantaneous goals and objectives.

If we move along the streets of my city in a rush, trying to find a certain type of shop or building, our experience will be different than the one we would have had if we were searching for something else.

Focus will change. We will see certain things and not notice other ones which we would have noticed otherwise. Some things we will notice because they are familiar, common, or because associate them to our cultures, to memories and narratives. All this process continuously goes on as our feelings, emotions, objectives and daily activities change, creating the tactics according to which we traverse places and spaces, to do the things we do.

In the density of cities, this process happens for potentially millions of people at the same time. In his "the Image of the City" (Lynch 1960), Lynch described

S. Iaconesi (✉) • O. Persico
Department of Digital Design, ISIA School of Design, Florence, Italy
e-mail: salvatore.iaconesi@artisopensource.net; http://www.artisopensource.net;
oriana.persico@gmail.com; http://www.artisopensource.net

V. Geroimenko (ed.), *Augmented Reality Art: From an Emerging Technology to a Novel Creative Medium*, Springer Series on Cultural Computing,
DOI 10.1007/978-3-319-06203-7_14,

cities as complex time-based media, symphonies produced by millions of people at the same time in their polyphonic way of acting, moving, interpreting, perceiving and transforming the ambient around themselves: a massive, emergent, real-time, dissonant and randomly harmonic, work of time-based art with millions of authors that change all the time.

In this, our mental maps – the personal representations of the city which we build in our minds to navigate them to fulfill our needs and desires – live a complex life as our perception joins into the great performance of the city.

Dissonance is the essence of the city itself, and represents its complexity, density and opportunities for interaction.

Harmony represents affordances, the things which are recognized and shared by different cultures. Those elements of the perceptive landscape onto which we can *agree* upon, which we recognize and attribute compatible meanings, allowing us to collaborate, meet, do things together. For example, Haken and Portugali (2003) have suggested a broad definition of landmarks to refer to any distinguished city elements that shape our mental map. Or as Appleyard (1969), Golledge and Spector (1978) who have conducted studies about the *imageability* of urban elements not because of their visual stimulus but because they possess some personal, historical, or cultural meaning.

We can imagine to design the affordances of places and spaces. We can use the understanding of what is consistently recognized and understood to design the elements of space/time which will describe to people what is allowed or prohibited, suggested or advised against, possible or imaginable. Lynch's concepts of legibility and imageability are closely related to James J. Gibson's notion of affordances developed in his direct perception theory, according to which the objects of the environment can afford different activities to various individuals and contexts. And, again, in Haken and Portugali (2003), all elements of a city afford remembering, as they shape in the mental maps in human minds.

In a further step in the direction of citizen activation, we can also imagine to make this type of understanding widely known and usable, to enable people to express themselves more effectively and powerfully.

These scenarios have become radically viable with the widespread of ubiquitous technologies. Nomadic devices (such as smartphones) and their applications we are able to merge our physical understanding of the world with the digital one forming a new physicality, visuality and tactility which shape our everyday experiences of the world.

According to Mitchell's "City of Bits" (1996), McCullough's Digital Ground (2005), Zook's and Graham's DigiPlace (2007) we are constantly immersed in emergent networks of interconnected data, information and knowledge which is produced by millions of different sources and subjects in the course of their daily lives. This data and information radically shapes the ways in which we have learned to work, learn, collaborate, relate, consume and perceive our environment.

If we are strolling in a park and we receive a notification of some sort on our smartphone, the natural environment could instantly transform into an ubiquitous, temporary office. If we want to make a decision about a certain thing we would like

to purchase while in a shop, a quick look online will help define our opinion in ways that can be very powerful. If we receive a message on our smartphone, our mood could change for the rest of the day.

Situated and ubiquitous information is able to powerfully transform, in real-time, the ways in which we experience places, objects and services, by providing the wide accessibility of other people's stories, emotions, expectations and visions.

This scenario is the one we have tried to address in our research: the conceptualization, design and implementation of a tool for urban navigation, in which the emotional narratives expressed by people while inhabiting and using urban places, spaces and objects become instantly and radically available, accessible and usable, to design new types of affordances for our cities.

We have decided to start from the idea of a Compass.

14.2 The Compass

The compass is a historically understood, ubiquitously known object dedicated to navigation and orientation: it finds the direction in which one wants to go.

Compasses are very easy to use (or, at least, to understand how they work) and are capable of providing direct, immediately accessible insights about the information they convey.

Different cultures and civilizations have used compasses for very different reasons, such as in the case of the Qibla compass, which is used by Muslims to show the direction to Mecca for prayers, or the Feng Shui compass, through which one is able to understand how to better orient houses' furniture and elements to obtain optimal energies.

The Feng Shui example is of particular relevance for the objectives our research. In its construction, the cardinal points are matched with an overwhelming amount of other information: over 40 concentric circles of writing and detail used to define the *Bagua* of your home, the ways in which energy flows. In the Feng Shui compass, the cardinal directions are combined with information coming from entirely different domains, and this combination gives rise to a completely different concept of orientation.

This is the idea that we wanted to explore in our research.

Is it possible to use the ubiquitous *infoscape* (the informational landscape) which is constantly produced by human beings on social networks to design novel forms of urban navigation? Novel ways of experiencing places? New ways for making decisions, for relating to one another, for consuming, for expressing and understanding emotions?

We started from the idea of emotions.

How is an emotional compass made?

How do you create a compass which harvests in real-time as much data about the ways in which human beings express their emotions on social networks, and uses it to have insightful emotional experiences in the city?

Is it possible to identify "emotional landmarks" – those places/spaces where, at a specific or recurring time, a certain emotion is expressed powerfully and abundantly – ?

If they do exist: do emotional landmarks change over time? Do they change according to the culture you are observing? To language? To the time of day, week, month or year? To the specific topic your compass is observing?

These, among many others, were the main questions which we asked ourselves in our research.

14.3 Previous Work

Abundant work exist which explores the idea of emotionally mapping cities and to propose forms of navigation that go beyond classical way-finding.

For example, Christian Nold's work on Biomapping (2004a) and Emotional Cartography (2004b). In the project, a rather large number of people have taken part in community mapping activities in over 25 cities across the globe. In structured workshops, participants re-explore their local area with the use of a device which records the wearer's Galvanic Skin Response (GSR), which is a simple indicator of emotional arousal, in conjunction with their geographical location. A map is created which visualises points of high and low arousal. Nold's work can be considered to be a seminal one in exploring how devices can capture location-based emotional states, and make them accessible through maps and other means. In our research we wanted to focus more on more complex possibilities to interpret human emotions, coming from the usage of language, and on the possibility to not only record emotions, but to turn them into active, searchable, usable, knowledge which anyone could generate and access.

Another example, the Fuehlometer ('feel-o-meter') (2010), was produced by german artists Wilhelmer, Von Bismarck, and Maus in the form of a public face, an interactive art installation that reflects the mood of the city via a large smiley face sculpture. It was installed atop a lighthouse in Lindau, Germany. A digital camera along the lake captured the faces of passersby, which were then analyzed by a computer program and classified as either happy, sad, or indifferent. The cumulative results determine the expression of the sculpture, whose mouth and eyes shift accordingly via a system of automated motors. Von Bismark's thoughts on the artwork are particularly interesting in this case: "we wanted people to start considering if they want people to read their emotions, and if they want to know others' emotions; if they want to be private or they want to be public. That's what it comes to in the end—what is private, and what is public?" The artwork itself provided us with precious guidelines about what we set forth to achieve: an immediately readable and understandable service. Yet the techniques it used proved

to be very limited in terms of the possibility for interpretation of human emotions, and for the production of usable knowledge out of them, including considerations on people's cultures, behaviors and relations in their interactions in the city.

Using a different approach, the City of Vilnius (2013) has found a way to track emotions on its territory using a social tool that gauges the average residents' level of happiness. Residents submit their overall level of happiness for each given day using their smartphones, or by scanning a barcode on the post advertising the initiative dubbed the "Happiness Barometer." Votes are later totaled to determine the overall happiness level of the town – displayed on a large urban screen and on the website.

Another example comes from an artwork titled Consciousness of Streams (2011). In the work the artists have set up a series of devices or installations in several cities. Users were able to contribute their geographic location, emotional state, as well as an image of their face or sound recording. The resulting information is constantly visible online under the form of a "real-time interconnected emotional map of the planet" (Iaconesi and Persico 2012) showing a topography of human emotions, adjacencies, proximities and distances which are not physical, but emotional.

Another relevant project is Mappiness (2012), part of a research project at the London School of Economics. This mobile app and online system actively notifies users once a day, asking how they're feeling. The data gets sent back along with users' approximate geographical location and a noise-level measure, as recorded from the phone's microphone. In this way users can learn interesting information about their emotions – which they see charted inside the application – and the operator can learn more about the ways in which people's happiness is affected by their local environment – air pollution, noise, green spaces, and so on.

An interesting project is "Testing, Testing!" (2011), an experiment developed by Colin Ellard and Charles Montgomery, and conducted in New York, Berlin, and Mumbai. By inviting participants to walk through the urban terrain, and measuring the effects of environment on their bodies and minds, Ellard aimed to collect data in real, living urban environments. That data would then be available for application within urban planning and design to enhance urban comfort, increase functionality, and keep city dwellers' stress to acceptable levels.

The last project which we wish to highlight is the Aleph of Emotions, an experimental art project by Mithru Vigneshwara (2012): a camera-like interface allows users to point along a particular direction, focus to a place along that direction, and click to view a representation of emotions in that place. The intention is to explore and find patterns in human emotions with relation to space and time. Data is collected based on keywords that define certain emotions. The results are finally presented with an interactive object. We felt, to a certain degree, this project to be really close to what we wanted to achieve. The major limitations which we have identified in its conception lie in the impossibility to comprehend human emotions in significant ways – due to the keywords-based approach –, and in the lacking sense of immersion in the information landscape.

14.4 Concept and Methodology

Our goal was to create an Augmented Reality Compass on a smartphone showing the intensity of emotions in the directions around the user.

For this we broke down the activity into different domains:

- the system to harvest messages from major social networks in real time;
- the geo-referencing/geo-coding techniques;
- the Natural Language Processing techniques;
- interface design and interactive information visualization.

14.4.1 A System to Harvest Messages from Major Social Networks in Real Time

There are many different techniques and technologies using which a system of this kind can be implemented.

The main issues we were faced with during the design and implementation process were both legal and technical.

Starting from the legal issues: users and developers wishing to use the features of major social networks have to abide to the rules dictated in the providers' Terms of Service (ToS), which are very complex legal documents

Most social networks offer Application Programming Interfaces (API) of some sort, which developers can use to build their own applications by interacting with the social network's ecosystem (users, communities, content, etcetera).

These APIs offer an opportunity for service designers and developers, as they permit accessing a vast amount of data about people's expressions and positions, the topics they discuss and the relations which they maintain, allowing for the creation of a variety of useful services.

APIs usage is constrained by the ToS, which limits the degree to which any developer or company is able to capture, process, use and visualize information coming from social network operators.

Limits are mainly imposed on:

- ownership of the data;
- number of interrogations over time;
- storage of the captured information;
- processing of the harvested information;
- visualization and branding.

These legal limits are different across different providers and also change quite frequently and arbitrarily.

Furthermore, it must be said that the issue of expectation for publicness also represents a very important legal aspect. Just as it happens when we go to malls

Table 14.1 Number of UGC harvested from social networks in different experiments

City	From date	To date	No. of UGC
London	Jan. 1st 2011	Feb. 1st 2011	5,143,500
Rome	Oct. 15th 2011	Oct. 16th 2011	91,538
Turin	Aug. 1st 2011	Sept. 20th 2011	240,982
Berlin	Jan. 4th 2012	Jan. 20th 2012	1,699,240
Hong Kong	May 1st 2012	Jul. 1st 2012	5,732,487
Cairo	Jul. 27th 2013	Sept. 2nd 2013	3,466,388

and shopping centers, we perceive them to be public spaces and, thus, we conform to what we have learned to be our rights and acceptable behaviors in public spaces. But this is not the case as different sets of rules apply in these spaces affecting anything from privacy, freedom of expression and basic rights. We have often clashed with this kind of issue, for example in trying to harvest all the user expressions on their feelings towards public policies enacted by governments and administrations.

That said, with the help of legal consultants we have managed to design a replicable model which includes clusters of rules which transform the legal specifications into technical and technological ones, and which we have been able to successfully use in these kinds of scenarios over the past 3 years.

Some limitations exist on the purely technical side, too.

In the first instance, the APIs allow for limited degrees of freedom in the querying and interaction with the databases of operators: not all of the information is made available and limitations on how developers are able to formulate the queries also exist.

Furthermore APIs frequently change, forcing development teams to constantly maintain and adapt the source code of the applications.

Once in a while, entire sets of features and possibilities disappear or change in form or availability, forcing designers and developers to go back to the drawing board and re-think or re-frame their services.

It can be said that the ideas of access and of interoperability are currently not among the priorities of social networking service providers.

We resolved most of these issues adopting a radically modular approach, using interoperable connectors to take into account the different scenarios with the different operators, and to abstract the main service logic from their implementation details. And providing us with the possibility to limit the damages whenever ToS or regulations changed on the operators' side. Table 14.1 shows the amount of data which we were able to capture using these methods in various occasions and experiments, across different cities.

This part of the activity has revealed to be a truly fundamental one, as we have actually developed a service layer which implements an easily maintainable abstraction and interoperability among different social network providers, and we're thinking to dedicating to it a separate research effort, to design the ways in which it could be offered as a service or as a novel source of real-time Open Data.

14.4.2 Geo-referencing/Geo-coding Techniques and Named Places

A number of different possibilities exist in trying to attribute a geographical context to UGC:

- users employ the features offered by social networks for geo-referencing their own messages (either using the GPS on their smartphone, or providing additional information);
- users include in the message information which can lead to finding out a location that they are talking from or about;
- users may use none of the previous possibilities, but include an indication of their geographical position (either current or by default) in their profiles;
- users do none of the above: in this case it is not possible to gather the user's location.

The third case has a low level of reliability. For a number of reasons, users may lie about their current or "home" location. For example, they commonly choose their favorite city, or a "cool" city, or a totally fictional location: on the popular social network Foursquare we currently reside in Mordor (taken from Tolkien's "the Lord of the Rings"), which we have placed, using the standard features offered by the system, a few meters away from our lab.

For these reasons, in our research we do not use these kinds of location specification (the "home" location or the current location as specified in the user's profile).

The first case is also very easy to deal with: a geographical location (often paired with extensive sets of meta-data, such as in the case of Facebook and Foursquare) is explicitly provided in the messages. Thus, we are able to use it.

From the analysis of the results of our experiments, the geo-location features offered by social networks are not very commonly used. The most common user behavior is to either turn on the location sharing features when they download the applications to their smartphone, or to forget about them.

From what we have been able to understand, the most location aware social networks are Foursquare and Instagram, with respectively 92 % and 30 % of the messages which have a location attached to them. Then comes Twitter, with 10–15 %, according to time and context. Then Facebook: if we exclude the posts related to events (which have a location attached to them), the percentage drops to about 4 %, and comes almost completely from messages generated using the mobile applications. These results are based on the messages we have collected over time in our experiments, and vary a lot across time and context. For example, many more messages with a location are generated on holidays and in times of vacation, and in the case of special events, such as the riots and revolts in Cairo, Egypt, during 2013. In this last case, for example, Twitter messages with a location specified rises up to as much as 18 %.

The second case in the list is more complex and interesting. It takes place when users do not use the platforms' features to include their location in the message, but, rather, mention the location which they're talking from or about in the text of the message itself.

First of all, it is important to try to understand whether the mention of a geographical location in a message is indicating that the message was produced in that location, or if it was talking about it: these two possibilities may completely change the relevancy of the message.

We have tried to formulate a working procedure with which to try and add location information to these kinds of messages.

We:

- built databases of Named Places for the various cities, including landmarks, street names, venues, restaurants, bars, shopping centers, and more, by combining the information coming from
  - publicly available data sets (for example for Italy we have used the named places provided by ISTAT, Italy's National Statistics Institute, 2013);
  - the list of named places contained in the OpenStreetMap databases, for example as described in OpenStreetMap 2013a, b;
  - the list of named places provided by social networks themselves, which allow using their APIs to discover the locations used by users in writing their messages, for example on Facebook (2013) or Foursquare (2013);
  - lists of relevant words and phrases, such as event names or landmarks;
- used the text representation in various forms of the named places in a series of phrase templates to try to understand it the user writing the message was in the place, going to the place, leaving the place, or talking about the place;
  - for example, the template "*going to [named place]*" would identify the action of going, while "*never been in [named place]*" would identify the action of talking about a place;
  - templates have currently been composed in 29 different languages, for a total of more than 20,000 different templates;
- each template was assigned a degree of confidence, evaluating the level of certainty according to which the sentence could be said to identify the intended information;
  - for example: "I'm going to [named place]" has a relevance of 1 (100 %), while the "[named place]" taken by itself has a relevance of .2 (20 %) as it might be a false match (imagine a bar with the same name of a famous landmark, for example);
- a threshold was established; if the sum of relevance degrees for templates matched to sentences was above the threshold, the information about content location was kept, else it was thrown away. Currently the threshold we use for this is of 90 %.

In the application we have, thus, chosen to gather geo-location information through explicit use of the location-based features of the services and, should they not have been provided, by combining them the results of the named places analysis.

14.4.3 Natural Language Processing and Artificial Intelligence to Recognize Emotions and Topics in Text

There is an extensive amount of research about the possibility to automatically interpret text to understand the emotion expressed by the writer, either on social networks or on more general texts.

We approached the possibility to recognize emotions by identifying in text the co-occurrence of words or symbols that have explicit affective meaning. As suggested in by Ortony et al. (1987) we must separate the ways in which we handle words that directly refer to emotional states (e.g.: fear, joy) from the ones which only indirectly reference them, based on the context (e.g.: "killer" can refer to an assassin or to a "killer application"): each has different ways and metrics for evaluation.

For this, we have used the classification found in the WordNet (Fellbaum 1998) extension called WordNet Affect (Strapparava and Valitutti 2004).

The approach we used was based on the implementation of a variation of the Latent Semantic Analysis (LSA). LSA yields a vector space model that allows for a homogeneous representation (and hence comparison) of words, word sets, sentences and texts. According to Berry (1992), each document can be represented in the LSA space by summing up the normalized LSA vectors of all the terms contained in it. Thus a synset in WordNet (and even all the words labeled with a particular emotion) can also be represented in this way. In this space an emotion can be represented at least in three ways: (i) the vector of the specific word denoting the emotion (e.g. "anger"), (ii) the vector representing the synset of the emotion (e.g. {anger, choler, ire}), and (iii) the vector of all the words in the synsets labeled with the emotion.

This procedure is well-documented and used, for example in the way shown in Strapparava and Mihalcea (2008), which we adopted for the details of the technique.

We adapted the technique found in Iaconesi and Persico (2012) to handle multiple languages by using the meta-data provided by social networks to understand in which language messages were written in and using a mixture of the widely available WordNet translations and some which we produced during the research for specific use cases.

An annotation system was created on the databases to tag texts with the relevant emotions (as, within the same message, multiple emotions can be expressed). For example, Fig. 14.4 shows the results of a full week of emotional harvesting in the city of Rome, for the emotion "trust".

We also tried to deal with the wide presence of irony, jokes and other forms of literary expression which are difficult to interpret automatically. To do this, we have followed the suggestions described in Carvalho et al. (2009) and in Bermingham and Smeaton (2010) with varying results.

14.4.4 Interface Design and Interactive Information Visualization

Given the intensive preparation phase, the information was, at this point, ready to be visualized and the interaction designed. We chose a very minimal layout, to allow the user to focus on the interaction mechanism, providing little-to-none additional detail beyond the emotional compass.

The interface development followed a two-phase sequence. First was designed a rough interface to understand the accessibility and usability of this kind of tool. The design was created in occasion of our Rome based tests, following a city wide riot which had happened the previous year, and of which we had been able to capture the social network activity.

In this first scenario a mobile application was designed that would poll the database for new updates, which came under the form of a list of basic emotions and their intensity in the various directions, relative to the user's current position.

In the first instance, we tried to use a standard AR canon, with the information being displayed on top of the live camera feed. In this layout, an arrow constantly showed the "forward" direction on the and was color-coded as to indicate the level of danger for the current direction: from a vivid green showing a lack of evidence about violence, to a full red denoting the presence of many violence-related messages in that direction (see Fig. 14.1).

While this configuration of the interface turned out to be really usable and accessible, it did not satisfy us for its readability. The information shown was extremely synthetic, bringing down the complexity of the available information to a single color. Of course, this was in line with the idea of implementing a compass, showing information about the direction in which the user is facing. But we felt that the trade-off represented by loosing all of the missing information (such as the declination of the different emotions involved in determining the output, or the possibility to show the messages taken into account to make the decision) was too steep.

In the next design iteration the information was, then, drawn on screen using a radial diagram, while the on-board magnetic compass and accelerometer controlled the diagram's rotation, to keep track of the user's heading and the device orientation (see Fig. 14.2).

The focus in this interface was to highlight the potentially dangerous scenarios, so that users would be able to avoid going in their directions. For this the default setup was pre-configured highlighting emotions of fear and grief, followed by anger and sadness. The user was able to use the settings button on the interface to choose from a drop-down (a scroll-wheel, on most smartphones) to choose from the other available emotions, so that the experience and goal of the experience could be personalized.

The third iteration of the interface was more general purpose (Fig. 14.3).

In this new form, a the color coded emotions would surround the white center, radially indicating the intensities of the emotions as they emerged around the user.

Fig. 14.1 The first iteration of the design: the *arrow* shows the predominant emotion in the current direction

The result was a multi-compass, with each color showing an emotion, its thickness around the center indicating its intensity in the relative direction. In the picture, the color purple, indicating boredom, is thicker in the upper right and lower left, showing that the emotion has been recently manifested on social networks to the front-right of the user, and to his back-left.

A pull-up menu can be dragged up by the user to toggle on/off the various layers, also obtaining a visual legend for the meaning of the colors. From the same menu, cursor sliders can be used to configure the sensibility of the emotional compass: in distance, from 100 m to 1 km (e.g.: if you choose 500 m, only the emotions generated within a 500 m radius will be taken into account); and in time, from 5 min to 1 month (e.g.: if you choose 2 days, only the emotions expressed during the past 2 days will be used).

The transformation of the emotional color blobs around the center take place using smooth, interpolated transitions, both to give the user a clear vision of what is changing, and to achieve a "blobby", organic look, which is able to visually communicate a situation in constant evolution.

Whenever the user reaches a location in which a certain emotion has recently been expressed with particular strength, the background starts pulsating in the color of the corresponding emotion: an emotional landmark has been reached.

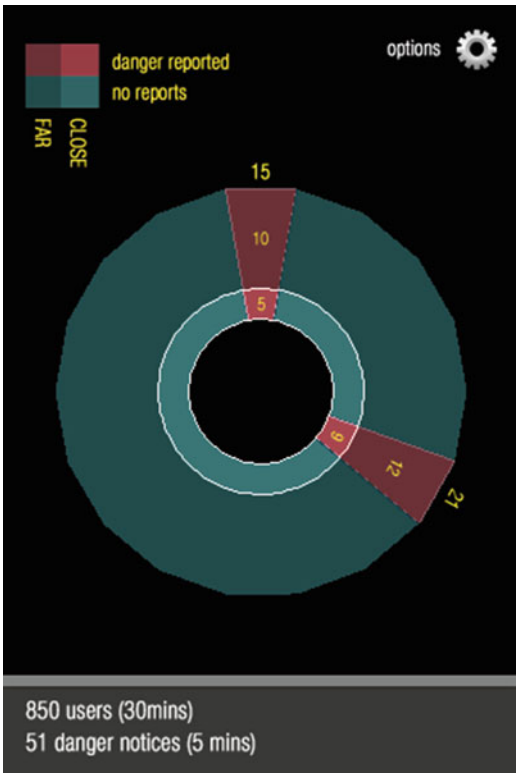

Fig. 14.2 The second iteration of the design: a rotating radial diagram highlights the danger zones

14.5 User Experience of the Artwork

The artwork is currently available as a prototype application for iOS and Android smartphones. It will be available on major stores as soon as the final beta-testing stages are complete (estimated late January 2014) and interested parties can request beta access by contacting the authors.

Throughout the interface design process we performed regular walks in the city which we observed on social networks to better understand how the application would transform our perception of the city.

The experience itself can be compared to the one of Rhabdomancy. While walking amidst the spaces of the city while using the compass, the ordinary way-finding reference items become less important. The color-coded intensity indicators for the various emotions provide the sensation of being able to access a geiger counter, or some sort of field intensity measurement device, showing the directions in which a certain emotion is stronger.

The impossibility to access street and topography based directions, for example, is strange at times sometimes. On the other hand, it gives the exact perception of being able to access a different kind of geography: one that is based on the intensity

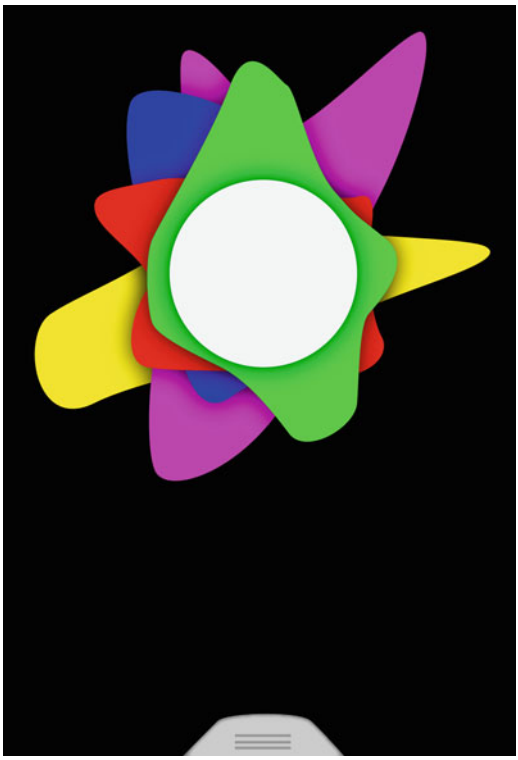

Fig. 14.3 The third iteration of the design: the emotional multi-compass

of emotions in a certain place, rather than its name or street number. It is definitely the perception of an energy field, of a radiation. As an example, while following the peak level of a certain emotion, we were faced with a wall, or a building or block that was standing in our way. In this kind of situation, the system did not provide any clue about the fact that the peak itself was to be found inside the obstacle (for example in the building) or beyond it. As we tried to go around the building we would be able to gain better understanding: if the peak reversed its direction once we were around it, it would clearly mean that the peak emotion was inside the building; if it kept on pointing in the same direction, it meant that the peak intensity was beyond the obstacle.

A similar effect could be achieved by acting on the slider which regulates the sensibility in terms of distance. Once faced with an obstacle it was possible to act on the slider to lower the senseable distance. By doing this it was sufficiently clear that if the peak disappeared at when the slider was lowered to the point of being nearer that the obstacle's perpendicular thickness, it would mean that the emotional peak was to be found within it.

Identifying emotional peaks in closed spaces proved to be quite a challenge: the lack of GPS coverage in closed spaces allows to easily identify the buildings in which a certain emotional peak can be found, but not to continue to search within them.

Using the application to follow multiple emotions at the same time has proven to be somewhat hard: with the different peak indicators all being independent, it has come out to be much easier just to follow one main emotion, and to eventually check the other emotional levels once arrived at a certain location

The addition of sounds has also proven to be extremely useful. A different drone-based sound loop of specific tones and texture was associated to each basic emotion, and its volume was connected to the instantaneous intensity of the emotion at the current user location. By wearing headphones users gets a really accurate sense of the com-presence of the emotions in the place they are currently in, also being able to momentarily switch off the various emotions/tones to associate each tone to the relative emotion. Creating sounds which have a drone-like, constant tone, but with evolving texture has been proven to give the best effects: users can create a generative song by walking around, depending on how social networks users expressed in that location (Fig. 14.4).

Also, the pairing of the sounds with the indicators, with specific focus on the color-coded on-screen alert which appears when an emotional peak is reached, has proven to be really effective, with the alert matching the maximum volume of the relative sound: when users heard these kinds of high volumes, they consistently checked the application display to see if the alert appeared. This also allowed users to use the compass from their pockets, navigating the city by following volume augmentations, and pulling the smartphone out only when the volume would be high, to check the visual confirmation that the emotional peak had been reached.

14.6 Conclusions

We have found this research path to be rewarding for its implications in terms of the possible artworks and services that could be designed by using the proposed methodology, and of the possibility to observe and experience urban environments in truly innovative ways. We can imagine highlighting the sense of security, of enjoyment or satisfaction, with enormous potentials for tourism, real-estate, entertainment, events and for public administrations wishing to discover and expose the ways in which people feel in the city.

On the other side, using these kinds of techniques, we are now able to understand cities better, in how people live their daily lives across cultures, languages, occupations and interests. For example, by simply filtering the meta data about language, we would be able to know the emotions of people in the city coming from different countries and cultures. We could see how they move around the city, we could compare them and the emotions they express, finding the ways in which they feel the same, or differently, at the different times of the days and weeks. We could use this information to better understand our cities, providing ways to empower multicultural ecosystems to form in more harmonious ways. The concept of the emotional landmark has proven to be very interesting. Which are the places in which different cultures more powerfully express a certain emotion, in different times of

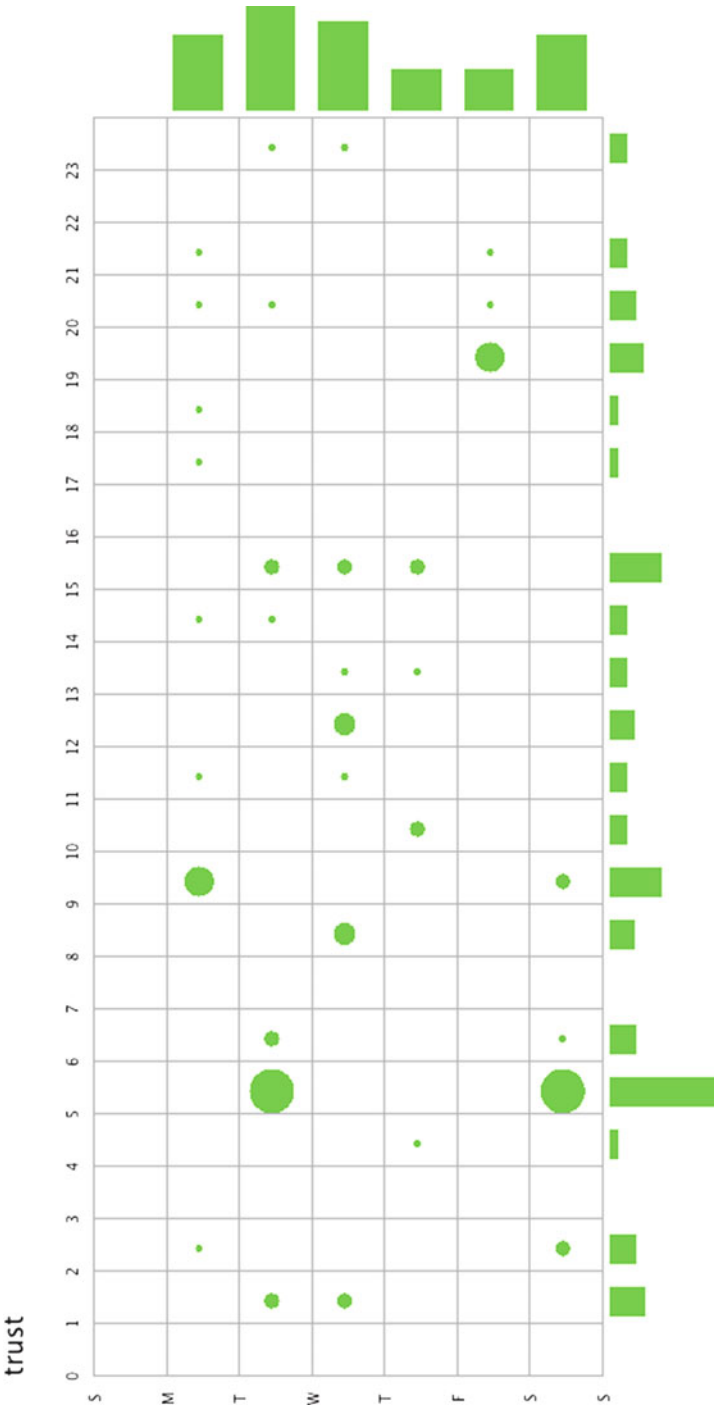

Fig. 14.4 An example of emotions captured in a city: "trust" in Rome, during the days/times of a full week

the day? How can we use this information? How can we design a city for emotions? These and more will be the questions which we will try to answer in the next phases of our research, together with the idea of opening up the process, promoting the accessibility and interoperability of this novel source of real-time, emergent Open Data that we have helped to shape: publicly expressed human emotions.

References

Appleyard D. Why buildings are known. Environ Behav. 1969;1:131–56.

Art is Open Source. Consciousness of streams. http://www.artisopensource.net/2011/01/12/cos-consciousness-of-streams/. Accessed 1 Sept 2013, and http://cos.artisopensource.net/ (2011). Accessed 1 Sept 2013.

Bateson G. Form, substance and difference in steps to an ecology of mind. San Francisco: Chandler Publishing Company; 1972.

Bell ET. Numerology: the magic of numbers. New York: United Book Guild, 1945.

Bermingham A, Smeaton AF. Classifying sentiment in microblogs: is brevity an advantage? In: CIKM '10 Proceedings of the 19th ACM international conference on information and knowledge management. Toronto; 2010. p. 1833–6.

Berry M. Large-scale sparse singular value computations. Int J Supercomput Appl. 1992;6(1):13–49.

Carvalho P, Sarmento L, Silva MJ, de Oliveira E. Clues for detecting irony in user-generated contents: oh...!! it's "so easy";-). In: TSA '09 Proceedings, CIKM workshop on topic-sentiment analysis for mass opinion. Hong Kong; 2009. p. 53–6.

City of Vilnius. The happy barometer. http://happybarometer.com/ (2013). Accessed 1 Sept 2013.

Ellard C. Testing, Testing! http://www.bmwguggenheimlab.org/where-is-the-lab/mumbai-lab/mumbai-lab-city-projects/testing-testing-mumbai (2011). Accessed 1 Sept 2013.

Facebook. Obtaining a list of places in a geographical area. https://developers.facebook.com/docs/reference/api/search/ (2013). Accessed 1 Sept 2013.

Fellbaum C. WordNet. An electronic lexical database. Cambridge, MA: MIT Press; 1998.

Foursquare. Obtaining a list of places in a geographical area. https://developer.foursquare.com/docs/venues/search (2013). Accessed 1 Sept 2013.

Gaiman N. Fragile things. New York: HarperCollins; 2006.

Golledge RJ, Spector A. Comprehending the urban environment: theory and practice. Geogr Anal. 1978;10:403–26.

Haken H, Portugali J. The face of the city is its information. J Environ Psychol. 2003;23(4):385–408.

Iaconesi S, Persico O. ConnectiCity: real-time observation and interaction for cities using information harvested from social networks. Int J Art Cult Design Technol (IJACDT). 2012;2(2):14–29.

ISTAT. Territorial Data Sets, including named places. http://sitis.istat.it/sitis/html/, http://www.istat.it/it/prodotti/banche-dati, http://www.istat.it/it/archivio/44523 (2013). Accessed 1 Sept 2013.

Korzybski A. A Non-Aristotelian system and its necessity for rigour in mathematics and physics, American association for the advancement of science 1931, Conference proceedings. Reprinted in Science and Sanity. New Orleans; 1933. p. 747–61.

London School of Economics. Mappiness. http://www.mappiness.org.uk/ (2012). Accessed 1 Sept 2013.

Lynch K. The image of the city. Cambridge, MA: MIT Press; 1960.

McCullough M. Digital ground: architecture, pervasive computing, and environmental knowing. Cambridge, MA: MIT Press; 2005.

Mitchell WJ. City of bits: space, place, and the Infobahn. Cambridge, MA: MIT Press; 1996.

Nold C. Biomapping. http://biomapping.net/ (2004a). Accessed 1 Sept 2013.
Nold C. Emotional cartography. http://emotionalcartography.net/ (2004b). Accessed 1 Sept. 2013.
OpenStreetMap. Key:place. http://wiki.openstreetmap.org/wiki/Key:place (2013a). Accessed 1 Sept 2013.
OpenStreetMap. Map features. http://wiki.openstreetmap.org/wiki/Map_Features (2013b). Accessed 1 Sept 2013.
Ortony A, Clore GL, Foss MA. The psychological foundations of the affective lexicon. J Pers Soc Psychol. 1987;53:751–66.
Strapparava C, Mihalcea R. Learning to identify emotions in text. SAC '08 Proceedings of the 2008 ACM symposium on Applied computing, Fortaleza; 2008. p. 1556–60.
Strapparava C, Valitutti A. WordNet-Affect: an affective extension of WordNet.. In: Proceedings of the 4th international conference on language resources and evaluation (LREC 2004). Lisbon; 2004. p. 1083–6.
Vigneshwara M. Aleph of emotions. http://www.mithru.com/projects/aleph.html (2012). Accessed 1 Sept 2013.
Wilhelmer R, Von Bismarck J, Maus B. Fuehlometer. http://richardwilhelmer.com/projects/fuhl-o-meter (2010). Accessed 1 Sept 2013.
Zook MA, Graham M. Mapping DigiPlace: geocoded Internet data and the representation of place. Environ Plan B Plan Design. 2007;34(3):466–82.

Chapter 15
Augmenting the Archaeological Record with Art: The Time Maps Project

Dragoş Gheorghiu and Livia Ştefan

15.1 Introduction: Augmentation as Solution to the Problem of Representation Versus Evocation

The current chapter is the result of the trans-disciplinary collaboration between an experimentalist (anthropologist and visual artist) and an IT engineer, aiming to validate the existence of different levels of augmentation during the process of recovering and communication of the Past, and to propose an educational use for these.

As nowadays the science and art conjunction (see Ede 2000) frequently appears in the frontline research of complex subjects (see the *Leonardo* journal for instance), the authors believe it could also be applied to the study of the Past.

The question is how can art and science be successfully merged with archaeology? One instance could be the application of the rhetoric process (Huys and Vernant 2012) of augmentation generated by art (Gheorghiu 2012a), to amplify with metaphors the meaning of an archaeological site, using land-art, installations or performances. Such a work of art, which could influence the perception of a place is not only *site-specific* (for an extended bibliography see Suderburg 2000: 1 ff), but also *site-augmentative*.

In the recent ethnographic/anthropologic research (for an extended bibliography see Pink 2006), as well as in the archaeological one (see Bonde and Houston 2013; Renfrew 2006), we saw the emergence of art topics such as evocation (Pink 2006;

D. Gheorghiu (✉)
Doctoral School, National University
of Arts, Bucharest, Romania
e-mail: gheorghiu_dragos@yahoo.com; http://www.timemaps.net

L. Ştefan
Integrated Applications Department, Institute for Computers, Bucharest, Romania
e-mail: livia.stefan@itc.ro; http://www.timemaps.net

V. Geroimenko (ed.), *Augmented Reality Art: From an Emerging Technology to a Novel Creative Medium*, Springer Series on Cultural Computing,
DOI 10.1007/978-3-319-06203-7_15, © Springer International Publishing Switzerland 2014

Tyler 1986), allegory (Clifford 1986), and image (Ifantidis 2013; Bradley 2010), because of the limitations of the representational process.

The augmentative character of art could be exploited to evoke complexity and replace a simple visual representation with fractal-like augmentative series of images that will augment the meaning of the initial image. In this perspective, a mix between art and science like art-chaeology (Gheorghiu 2009a, b, c, d; Gheorghiu 2012b), could, through the rhetorical use of augmentation, function as an evocative instrument to approach the archaeological record (Gheorghiu 2012a). This is the central idea of the current chapter, which intends to present the techniques of Augmented Reality as an artistic process, labelled ARt or Art-chaeology.

The knowledge of the Past is important not only for science but also for the local communities, in the case of the latter especially for the development of the local identity, as well as for the practical aspects of economic development arising from tourism. Another aspect, also very important, is the salvaging of the immaterial heritage. It is well known that (UNESCO 2003 Convention[1]) the immaterial heritage is as important as the material one, as it refers to the know-how of contemporary traditional and urban societies.

We will present a case study of the salvage of the immaterial heritage using AR techniques carried out within the research project "Time Maps. Real communities, Virtual Worlds, Experimented Pasts" (Grant PN II IDEI).[2] This project examines the rescue of the immaterial heritage and its transmission to future generations, while attempting at the same time to evoke the complexity of the Past through AR techniques. Although "Time Maps" is developing simultaneously in several locations in Europe, the current discussion will be limited to only one site where the ARt-chaeology strategy was applied for a longer period of time, namely the Vădastra village, situated in the Danube Plain in the south of Romania (Gheorghiu 2001).

"Time Maps" extends the search area for immaterial heritage up to ancient technologies, which today are not yet considered "heritage". Today's archaeological approach is still limited to the process of conducting the scientific experiment (Mathieu 2002, but see also Gheorghiu and Children 2011), rather than preserving the resulting technology. A way of presenting the immaterial heritage to the public is through re-enactments, which are not recognised by the archaeological discipline as being scientific approaches. Therefore, the two extremes that frame the access to the immaterial heritage of ancient technologies are, on one hand, the scientific experiment which insists on the "objectivity" of the approach, and on the other, the re-enactment which insists on the phenomenological experience of the art performance.

Consequently, a mix of the two strategies would create a synthesising approach to ancient technologies, since it would simultaneously comprise their representation and evocation. The question then becomes, how can one render ancient technologies comprehensible and attractive for a twenty-first century public?

[1] http://www.unesco.org/culture/ich/index.php?lg=en&pg=00002

[2] www.timemaps.net

To achieve this goal, an ARt-chaeological approach could provide a practical solution to the problem, since the recovery of the immaterial heritage presents itself as a process where representation is not operable all the time, and where the augmentation created by art could fill the voids of information through a process of art evocation.

The ARt-chaeological approach was applied to Vădastra rural community, to recover their traditional and ancient immaterial heritage, helping it thus revitalise the local arts and crafts, and to develop a participatory tourism. This strategy was based on the exploitation of the possibilities of augmentation offered by IT portable devices.

Vădastra is a village with a very rich stratigraphy, beginning with the Palaeolithic and continuing up to the modern epoch. Since the most significant level of dwelling is represented by the eponymous Chalcolithic culture, dating from the 5th millennium B.C. (Mateescu 1978), characterised by splendid tri-chrome ceramics (Burghelea et al. 2001), this level was chosen to exemplify the Time Maps' viewpoint.

15.2 An Archaeological Fractal-Like Perspective on the Past (From a Macro to a Micro Level)

15.2.1 Mapping and Mixing Up

Our opinion is that augmentation, which is a palimpsest-like process of overlapping information, could also be creatively used under a fractal form. Fractals are characterised by the fact that every detail unveils new ones (see Mandelbrot 1983), each detail being more important than the whole image (Mandelbrot interview, in Albers and Alexanderson 2008). In archaeology, a search for fractals was achieved by Zubrow (1985) and Brown et al. (2005).

A difference between a classical fractal, where the observer "should envision an infinite regression of smaller and smaller images that constitute a whole that is similar to its parts" (Brown et al. 2005: 40), and the one we propose is, in our instance, that the detail- images (or "parts") are icons different from the source-image (or the "whole"), but their meaning augments the whole.

When one decomposes in a fractal way an archaeological complex (i.e., a prehistoric settlement like Vădastra), this operation creates an immersive regressive (Brown et al. 2005: 40) trajectory (Benford and Giannachi 2011: 230ff), where the relations between parts and whole, and between real and virtual/immaterial, repeat itself at different dimensional scales. From a semiotic point of view this trajectory of the fractal-like decomposition of the whole into parts is an antinomy to that of the functioning of Giambatista Vico's (1744: 129–31) rhetoric tropes. It is well known that the basic tropes, synecdoche or metonymy, create the whole from fragments, the part evoking the whole (Chandler 2007: 123ff). In our approach to evoke the Past,

especially its immaterial aspects, we propose the whole to successively decompose into its significant parts, thus augmenting the information about the context.

In the present approach an emphasis is placed on the importance of the context (i.e. the "whole"), whose main role is to augment the information on the objects and different human actions performed within it. Consequently, the research started with the identification of the place of the archaeological contexts on the village site, followed by a GPS survey with mobile phones and tablet PCs, and the positioning of the referenced points on Google maps. This stage of defining a context using the concept of Point of Interests (POIs) is a characteristic of the geo-based AR applications and authoring of the AR browsers (Butchart 2011). For a large number of POIs this authoring stage can be performed online using Google's KML (Keyhole Markup Language) file formats, which can be directly uploaded in AR platforms like Wikitude,[3] to create so-called Wikitude worlds. We also experimented other AR platforms which need a CMS (Content Management System) to automatically perform this task and create the so-called AR-layers (Layar[4]) or AR-channels (Junaio).[5]

After this operation one of the contexts (i.e., a Chalcolithic village) was partially built under the form of a series of wattle and daub dwellings inspired after the architectural remains excavated, ethnographic sources, and the iconography of the prehistoric architectural miniature ceramic objects (Gheorghiu 2010). A total reconstruction of the shape of the settlement surrounded by a ditch and a double palisade was completed in VR. All the architectural features were modeled in Autodesk 3Dmax, with a high resolution of details. For creating a realistic atmosphere of the settlements special attention was given to the nocturnal illumination and textures of objects. A version of this model was designed with a lesser degree of complexity, i.e., mesh-based, in order to be optimized for the use in restrictive environments (e.g., transmission via mobile communications and rendering on mobile devices).

The augmentative mix of real objects and virtual reconstructions, like the one created for Time Maps, is a method practiced in contemporary art (see Paul 2011: 71ff). This particular case it is an application of the Augmented Reality (AR) and Augmented Virtuality (AV) techniques. Both AR and VR belong to a real-virtual continuum, as Milgram and Kishino (1994) defined it. While AR allows a real time synchronized overlapping of virtual objects on a real image captured with a live video camera, AV only performs an introduction of real information into a virtual world.

Another difference is that AR represents a complex technical process (Azuma 1997), necessitating 3D registration processes and collision detection because of the synchronisation with reality, while AV could be more easily implemented through a simple mixing process.

[3] www.wikitude.com

[4] www.layar.com

[5] www.junaio.com

To obtain efficient effects with augmentation, both technologies were applied in a creative way to generate a cognitive and aesthetic impact on the user.

15.2.2 Between Scientific Experiment and Re-enactment

The recapture of a technology means primarily the identification of the *chaînes-opératoires* through experiment. For recovering Vădastra's prehistoric technologies of ceramic vase and textiles making, a series of campaigns were organised between 2002 and 2012. As a result these technologies were recuperated and transferred to the local community. But for transmitting these technical processes to the persons outside the circle of experimentalists, and to make them attractive for the young people who were supposed to learn them and transmit them to the future, the simple recovery of the technical gestures was not sufficient. Here the reconstructed contexts come into play, where the prehistoric wattle and daub constructions, ceramic vases, or the textiles woven on different kind of looms, as well as the performances of producing these objects, were introduced as augmented information. One such example of a performance in context concerns a woman working at a horizontal loom, sitting on a bench, inside a decorated wattle and daub house.

All performances were filmed with professional video cameras, after which the films were post-processed to render in a suggestive way the technological processes and employed as augmentations in a geo-based AR application. Another stage was an advanced usage of these films to augment the VR reconstructed contexts and to create an AV environment. This was possible with extensions of current AR technologies, such as Metaio, which can be integrated with the Unity3D game engine.[6]

15.2.3 The Reconstruction of Objects in Reality and Virtual Reality

The following stage of approaching the Past in a fractal way was the utilisation of real or virtual objects resulted from each technology experimented, to populate the hybrid contexts created, augmenting them with important information about the spatial organisation and utilisation, and creating a good medium for the immersion of the viewer. As de-contextualised objects they constituted the data bases of "virtual museums".

To present real and virtual objects together on mobile phones, we created a geo-based AR application (*ARt-chaeology,* see Fig. 15.1) with the capacity of identifying geographic locations and triggering visual information under the form

[6] www.unity3d.com

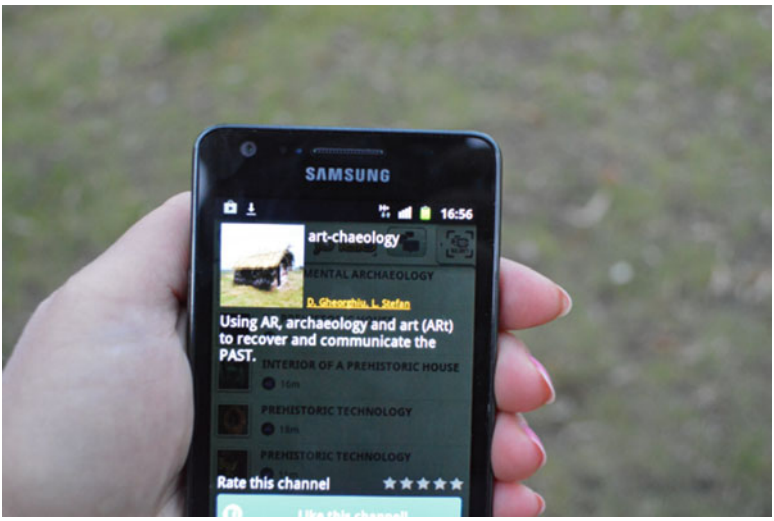

Fig. 15.1 The *ARt-chaeology* application for mobile devices

of 3D simplified models, texts and video files. Due to the effect of transparency all these objects could be drawn on a real image, producing an effect of immersion into the newly created real-virtual environment.

15.2.4 Materiality: Textures and Colour

A final level of the fractal approach is represented by the visualization of the attributes of the objects created through the recovered technologies. Besides the shape, the objects' other characteristic, from the perspective of sensorial perception, is their materiality, i.e., their texture and colours; consequently, the rhetoric augmentation of the textures of a virtual object could create tactile sensations similar to the ones generated by a real object (see Brogni et al. 2011: 235ff).

This is the reason why the attributes of objects in the reconstructions of every level of dwelling were emphasised, and data bases with the textures and colours of the specific materials were made, to evoke the tactility and colours of the ancient dwelt spaces. For example, for the prehistoric period, the database contains the colours of the local dye plants, soils, ceramics, flints, woods, hemp, charcoal, wool, and many other materials from the archaeological record and ethnographic sources, together with the coloured textures of these materials.

Collages with JPG images extracted from these databases are overlapped on the images of the interior of the wattle and daub prehistoric house when one points the mobile phone to a coloured or textured surface. The IT application was designed to identify these attributes of the objects. Here again the AR technology

was applied, but with visual contexts acting as triggers for the virtual information. The identification of the visual attributes is performed through techniques of visual search through a set of reference images, or patterns, or a 3D cloud point-model, pre-loaded in a data base. This recognition-image-based AR, due to a series of linked sequences of augmentations, allows the implementation of the fractal approach to evoke the Past proposed by us and increases the degree of evocation and immersion.

15.3 State-of-the-Art of the Applications

In order to create our palimpsest consisting of layered real and virtual information, we explored the state-of-the-art Augmented Reality applications in archaeology and art.

We were mostly interested in AR applications on mobile devices (MAR), which implement the larger concept of Mixed-Reality. A comprehensive history of MAR evolution and applications can be found in Wagner (2005) and Karlekar et al. (2010).

This kind of AR applications extended the initial AR concept (Milgram and Kishino 1994; Azuma 1997) to location-based services, due to a diversification of the augmentations, from 3D graphics to images, sounds or videos (Butchart 2011). One category of AR applications are context sensitive, and function as mediascapes[7] AR information browsers (Reid et al. 2005), while another category, closer to the initial theory of AR, performs 2D and 3D image tracking and visual search for triggering the augmentations (Butchart 2011).

State-of-the-art AR applications were developed for tourism and cultural heritage: Pompeii (Papagiannakis et al. 2005), Rome Reborn, Archeoguide (Vlahakis et al. 2002). In art AR was explored in augmented museum tours (Science Museum in Paris), personal augmented exhibitions (Sheffield Gallery[8]), or digital creations (e.g., Geroimenko 2011, 2012), in as well as film. More examples can be found in Craig et al. (2009).

In spite of the existing state-of-the-art applications, we consider that the number of the AR applications must increase in order to create an ecosystem, sufficiently broad for this kind of applications to have an impact and promote usage by a larger public.

15.4 State-of-the-Art of the Development Tools

Although several of its technical aspects are to be further improved, AR can be currently considered a mature and stable technology, with a diverse offering of development environments and tools. These are both open-source (AR

[7] http://www.hpl.hp.com/mediascapes HP Labs [accessed 1 Dec 2013]

[8] http://www.sitegallery.org/archives/3091 [accessed 7 Jan 2014]

Toolkit) and commercial (Wikitude, Layar, Junaio, Aurasma). Furthermore, several standardization proposals exist for imposing a standard AR language and geo-based data sets (ARML[9] or KHARMA[10]) in parallel with proprietary languages (Metaio AREL[11]). Interactive UIs can be created by leveraging standard browser-based technologies (HTML 5, JavaScript). Integration (mash up) of AR applications with other services (social networks, touristic and city information), and with other mobile or AR applications is currently possible, expanding the category of applications that can be developed.

Some development tools (Vuforia Qualcomm[12] and Metaio[13] for iOs and Android, String[14] for iOS) can integrate Unity[15], a well-known 3-D authoring tool and gaming engine, which makes possible the association of advanced 3D graphic effects (similar to the ones encountered in video games) with AR, and increasing the immersion effects of the AR application.

15.5 Similar Works

Creations of art-chaeology using Augmented Reality were previously proposed by the authors, e.g. Ştefan and Gheorghiu 2013a; Ştefan and Gheorghiu 2013b, and consisted in augmentation of a printed map with films and images after scanning with a smartphone the QR codes and the reference images.

15.6 The Methodology

Some authors (Arth and Schmalstieg 2011) consider that the development of an AR system is concerned mainly with the implementations of the interfaces. Other authors (Bimber and Raskar 2005) consider that the Augmented Reality is a new human-machine interface, which "has the potential to become more efficient for some applications than for others". The AR application development (which is different from other applications) is similar to that of the AR user experience, because it strongly involves the human senses.

---

[9] http://openarml.org/wikitude4.html [accessed 15 Oct 2013]

[10] https://research.cc.gatech.edu/kharma/ [accessed 7 Jan 2014]

[11] http://dev.metaio.com/arel/overview/ [accessed 7 Nov 2013]

[12] https://developer.qualcomm.com/mobile-development/mobiletechnologies/augmented-reality [accessed 1 Nov 2013]

[13] http://dev.metaio.com/sdk/getting-started/unity3d/running-the-tutorials-app/ [accessed 7 Nov 2013]

[14] www.poweredbystring.com [accessed 7 Jan 2014]

[15] https://unity3d.com/

It is also important to define the purpose of the application, the AR scenario, the design of the augmentations, which is also a highly creative stage.

Other authors stress the importance of prototyping the AR application (Mullen 2011) as a method of elaboration of an AR application, i.e., the design and implementation of the general application structure, as a different stage from the one of authoring and adding the augmentations.

There are two possible approaches for the development of an AR application: (a) use of rapid development or authoring tools, which does not require programming skills, the development effort being focused on the creative part of authoring the augmentations and loading them on CMS platforms; (b) use of programming and of SDKs (Software Development Kits) which allows the integration of the AR functions in a general purpose application, a method for creating complex and highly customized applications. In our case we opted for the former approach because it allows for the creation of device-independent applications, i.e. compatible with different mobile OS (iOS, Android or Blackberry), while the latter would have restricted us to device dependent applications.

Because the current AR platforms allow the combination of geo-based applications with image-recognition ones, we opted for both tracking technologies to implement our concept of fractal-like evocation of the Past.

Initially we implemented a demo AR application to test the technology for which chose the Layar platform with Wordpress as the CMS and Google's Feed-George plugin for the management of the geographic locations (POIs) and the augmentations. With Layar we created the ***ARt-chaeology*** layer. In the second stage we chose the Junaio AR browser from Metaio because we needed certain advanced capabilities: 3D tracking, video textures, interactive augmentations, and an immersive experience based on the Unity3D gaming engine. On this platform we created two channels, a geo-based one and an image-recognition one, which were linked to create a unified experience.

The application authoring involved the following steps:

- Definition of the POIs and geo-referencing of the archaeological area;
- Creation of the explanatory texts for the applications and the POIs;
- Authoring of the application logo;
- Development of icons for the visual customization of the POIs on the map;
- Authoring of the augmentation: texts, movies, 3D models, optimized for renderization on mobile phones and mobile internet communications, i.e. to reduce time and costs;
- Definition and implementation of the gallery of reference images (the 2D-trackables);
- Creation of the 3D cloud point model of the prehistoric house (the 3D-trackable);
- Loading of the content in the CMS platform;
- Testing and adjustment of the display size of the images taking into account the distance to, and the dimension of, the real images.

15.7 Description of the AR System

In order to perform the fractal-like immersion in the Past, from a macro level of the real place of the archaeological site to a micro one, that of material textures, with the purpose of presenting to the public the immaterial heritage in context, we decided to use mobile devices, i.e. Android smartphones.

These implement the "video view" with the integrated video camera, which presents the advantage of a wider visual field, and the fact that the lags of the real image and of the rendered virtual object are comparable.

The AR experience on the smartphone is explained below:

- the GPS receiver and the compass for location-based AR, or video camera for image recognition, identifies the user localization and performs an image of the "reality";
- the haptic technologies (touch/multi-touch screen) and the sensors from the mobile devices (accelerometer, gyroscope, compass) translate the movements/user position/user behaviour related with the real scene and objects;
- the AR application searches for the virtual information, associated with elements from the real environment (geographic position or a visual element) texts, images, 3D models, videos, sounds, web site;
- the digital information is presented in a visual and/or aural manner, and synchronously with the real world.

For natural integration of the virtual information, the camera has to perform perspective projections of the real 3D world in 2D plane images. The virtual object is modelled in a reference system and generated over the live video stream using low-level graphic functions. The AR system uses information about the real scene (if available, after a previous scene modelling) in order to correctly render the object.

For the graphical object to appear in the right place, it is necessary that the AR system evaluate the position of the object in the real world, its orientation and dimension. This process is called the 2D alignment of images in a real 3D scene.

15.8 The AR Application

The process of fractal-like immersion was implemented through the augmentation of each stage, starting with the chosen geographic location and ending with the materials/textures and colors specific to the prehistoric objects.

The application is launched in ***geo-based mode***, which is using the data read by the GPS receiver and the compass, which for all intents perform a geographic "scan" of the village landscape.

The POIs identified represent the a prehistoric settlement and the place of the experimental reconstructions, and are displayed as icons on a Google Map

Fig. 15.2 The Map View mode of the AR application

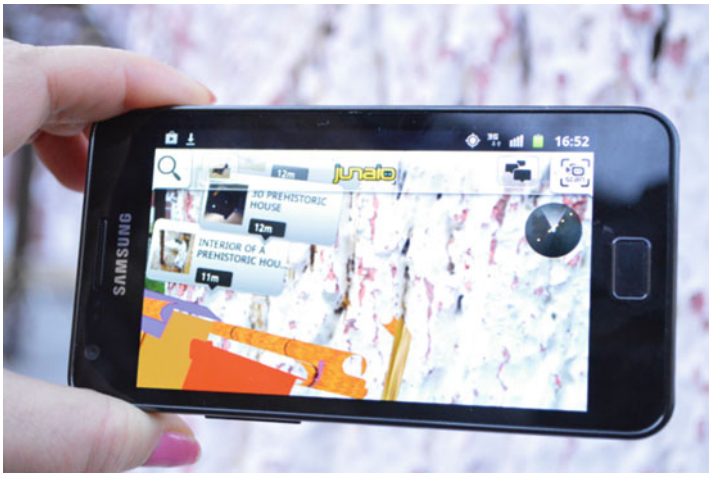

Fig. 15.3 The AR View mode of the AR application

(Fig. 15.2) using the *Map View* mode, or over the real image, as floating billboards, using the *Augmented Reality View* mode (Fig. 15.3) which activates the video camera. Each billboard can be selected with a touch of the screen, which determines the display of explicative texts referring to the purpose of the application and the historic context.

Fig. 15.4 Landscape of the Vadastra village displayed on the mobile device

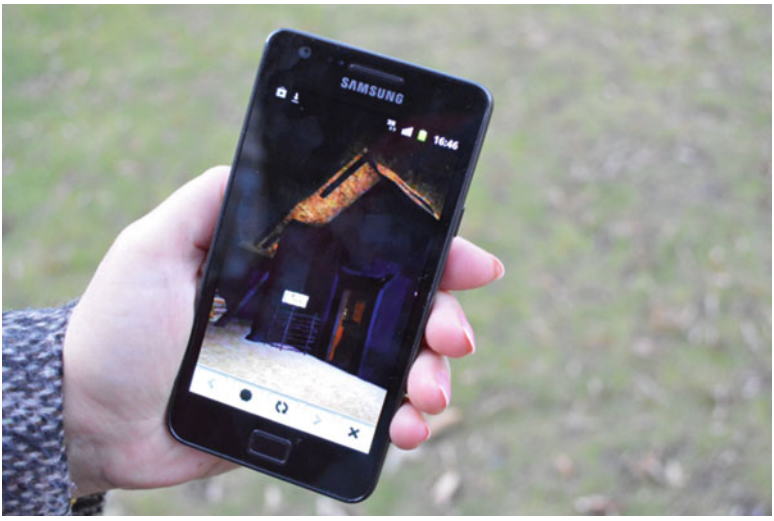

Fig. 15.5 3-D augmentation: reconstruction of the prehistoric village

For the immersive experience, the *Augmented Reality View mode* has to be maintained. The AR experience follows the sequence below:

1. The landscape of the Vădastra village is displayed on the mobile devices (Fig. 15.4).
2. Over the real landscape, the first triggered augmentation is a 3D object representing the virtual reconstruction of the prehistoric village (Figs. 15.5 and 15.6).
3. Outside a 10 m radius around the starting point, within which the observer has the time to understand the general form of the settlement and his internal

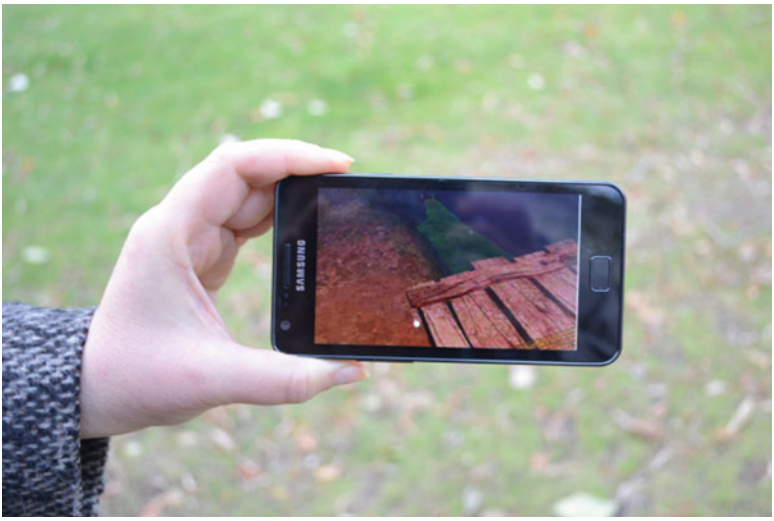

Fig. 15.6 3-D augmentation: reconstruction of the prehistoric village

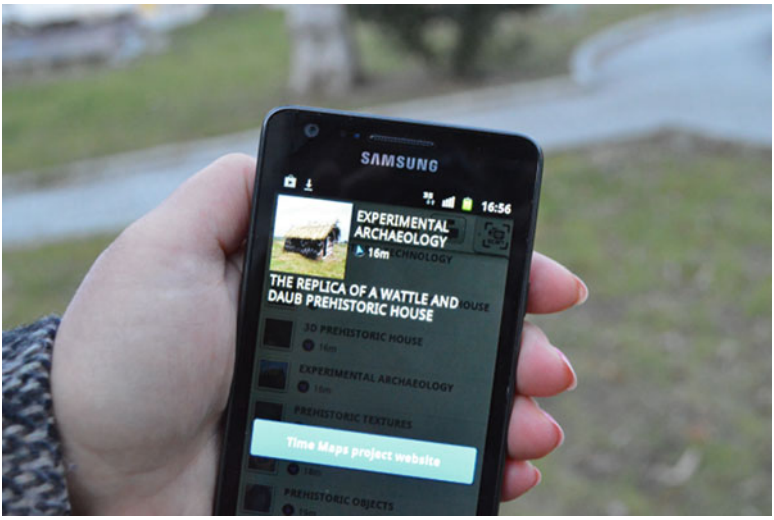

Fig. 15.7 Image augmentation: the experimental prehistoric house

organization (floating over the contemporary landscape), the existing image is overlapped by another augmentation which becomes visible, i.e. the image of a prehistoric house (Fig. 15.7). This image is of a real house, constructed as an archaeological experiment, and is provided with an explanatory text and the suggestion to the viewer to scan the experimental prehistoric house.

4. At this stage, the user has to toggle the application to the ***Image-recognition mode***, scan the house and enter a more immersive experience, represented by a

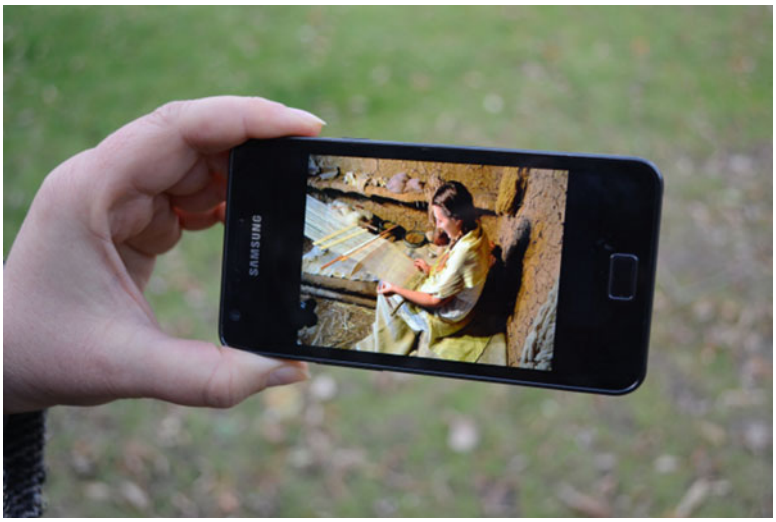

Fig. 15.8 Video augmentation: weaving with a horizontal loom

3D virtual tour which leads him through the prehistoric house on a pre-defined route. There he/she will discover the details of the interior design and different household technologies, with the help of video films played sequentially. These films represent a re-enactment of prehistoric technologies: weaving with a horizontal loom (Fig. 15.8).

5. Following the visualization of the house's interior, the user has to toggle back to the ***Geo-based mode.*** By moving the smartphone left and right, upwards and downwards, other images and 3D reconstructions of prehistoric objects (vases, textiles) (Figs. 15.9 and 15.10), manufactured with these technologies, and images of the technological instruments (kiln, loom) (Fig. 15.11) become visible.
6. Continuing the exploration, the visualization of each object is followed by a detailed display of its texture and color (Figs. 15.12, 15.13 and 15.14) covering almost the entire viewing area of the smartphone.
7. After completion of this route, the application allows the visitor to re-access the map of the place (the Map View mode) and to once again visualize the POIs, repeating the immersive experience, or to quit the application.

15.9 The 3D Virtual Tour

To further expand the AR immersive experience on mobile devices we performed a hybridization of technologies and performed a mix of real and virtual media in a game-like environment. We chose Unity as an authoring tool for the AR experience, and as a real time engine, integrated with the Metaio AR functions.

Fig. 15.9 Image augmentation: prehistoric vases

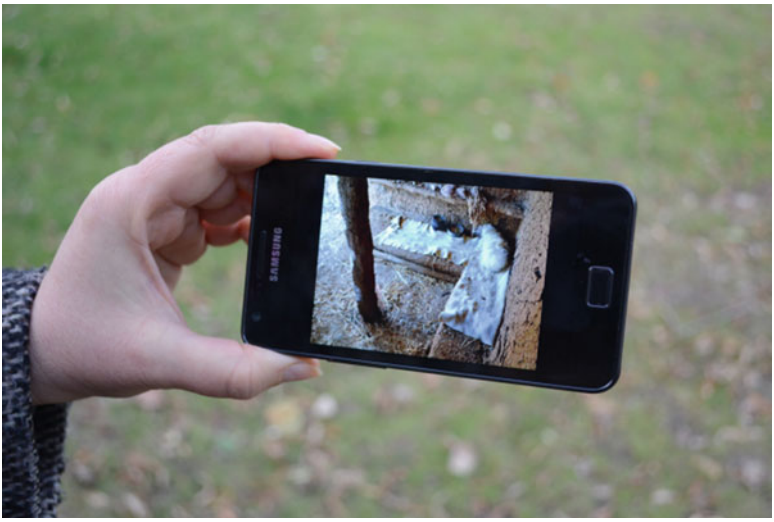

Fig. 15.10 Image augmentation: prehistoric textiles inside the house

We used an advanced functionality of the Metaio AR technologies, i.e. the 3D tracking using a 3D point cloud model of the prehistoric house. For this we pre-trained the point cloud of the model using a Metaio tool on Android devices (Fig. 15.15), available through the App Store.

In the reconstructed interior of the prehistoric house, we defined touch sensitive zones, which upon clicking trigger videos displaying re-enactments of each technology.

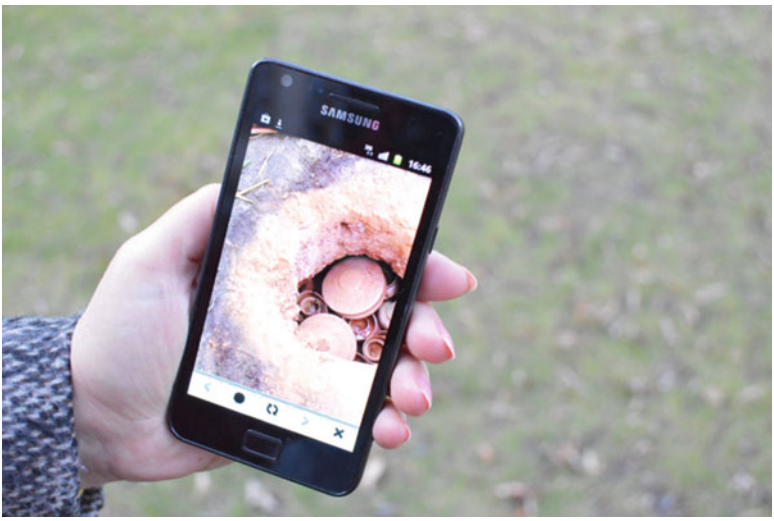

Fig. 15.11 Image augmentation: prehistoric kiln

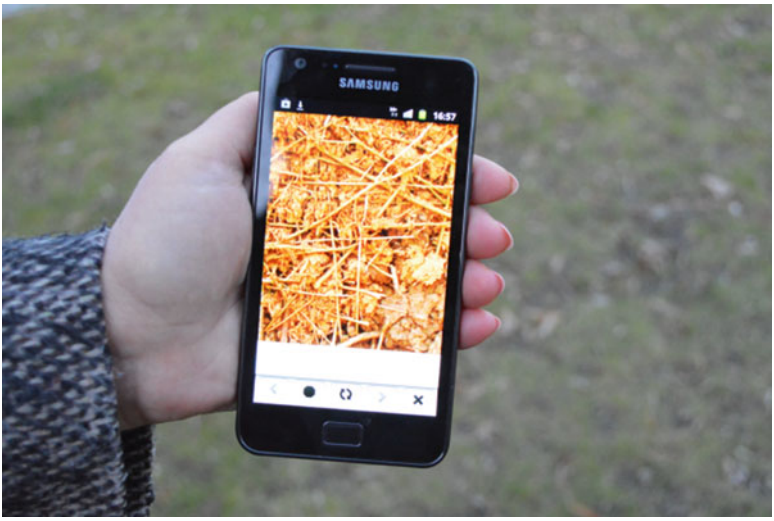

Fig. 15.12 Image augmentation: prehistoric textures and colors (clay and straws)

15.10 The 3D Objects

For the 3D objects we used the Wavefront OBJ format, which is a high quality graphic data for static meshed-based objects. The models were optimized (as polygons and textures number, baked lighting a.s.o.) in order to reduce the costs

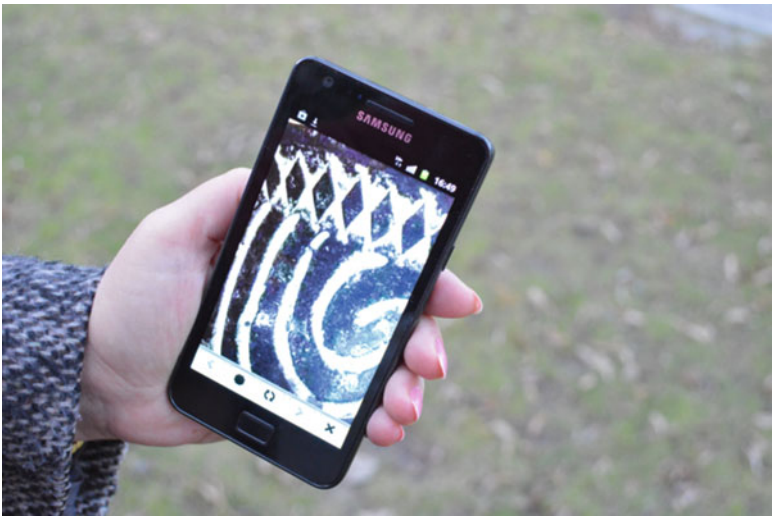

Fig. 15.13 Image augmentation: prehistoric textures and colors (decorated ceramics)

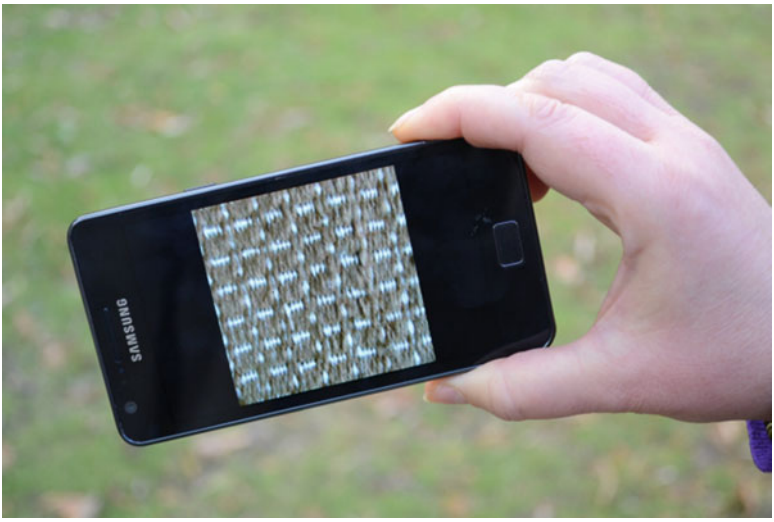

Fig. 15.14 Image augmentation: prehistoric textures and colors (textile)

when these models are downloaded from the remote database through mobile communications. The digital dimensions were correlated with the real ones, taking into consideration that 1 digital unit corresponds to 1 mm (in real physical measurements).

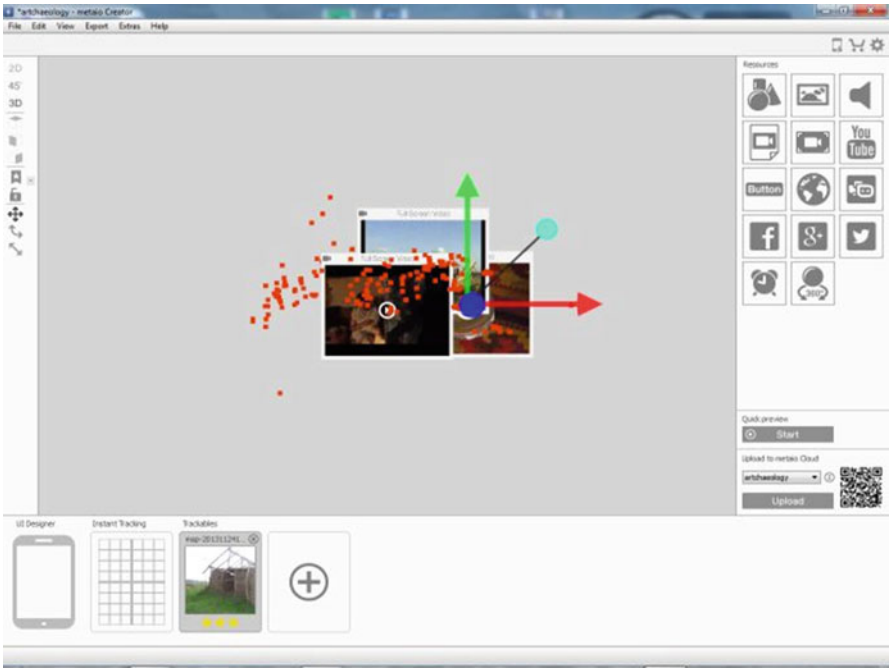

Fig. 15.15 3D point cloud model of the prehistoric house (Metaio Creator)

15.11 Discussion

The process of developing the AR experiment was a creative one both in the elaboration of the application concept and in the creation of the augmentations (e.g. videos, 3D modeling or images), which were implemented by artists and technicians.

The AR/MR technology allowed the mix of real and virtual worlds and brought about an augmentation of both. The techniques were the combination, in the same visualization, of the real environment and the virtual information, resulting in a new reality, complemented by annotating the real world portion of it with visual and textual information.

For the creative use of the AR technology potential, it is necessary to understand the AR processes in order to select the most adequate one for the application purpose. One of this is the tracking process. In our case, we decided to use location-based tracking and 3D cloud point modeling of a real object. The 3D tracking is an advanced method, which allows the AR applications to integrate naturally with the real world and thus avoid using markers or reference images. Metaio's AR technologies implement this 3D tracking of pre-modeled objects.

To make the location-based AR an immersive experience, we displayed 3D objects, 2D images and artistic video films to augment the reality of a village landscape.

To enhance the immersive experience we decided to use the Unity gaming engine in an AR settlement based on image-recognition. The reconstruction of a 3D complex scene (the prehistoric house) benefited from special graphical effects (such as lighting). The experience is similar to that produced by a video game. Metaio's SDK integrates with the Unity3d.

Our experiment benefited from the use of mobile devices which favor the mobility of the user, the enhancement of the exploratory AR experience (as a mix of art and science), and the wide scale implementation of open-air AR projects. The experience and its immersive effect can be further enhanced by using mobile devices with larger display screens, e.g., tablet PCs.

The Layar platform exploited in the first stage of our Art-chaeology experiment allows for rapid development and the testing of the technology, while Metaio's technology and the Junaio browser provides advanced functionalities and the option of authoring complex AR applications. Furthermore, this platform allows the creation of video textures and linking of different AR channels in order to create complex story-based scenarios.

The application developed provided an interactive and engaging way of transmitting historical information.

Finally, our method and technology also had an educational impact on the viewers. The process of explaining the real environment with multimedia augmentations and the use of art as a vehicle for the transmission of information had a noticeable educational effect, especially on children.

The method proposed in this chapter, namely of exploiting the potential of augmentations in a fractal-like analysis, also demonstrated its pedagogical efficiency when applied to the Vădastra Primary and Secondary Schools, during the course of two campaigns in conducted in 2012 and 2013 (Fig. 15.16).

15.12 Conclusions

The present paper offers an argument in favor of the importance of augmentation as an evocative instrument, in a mixed strategy combining art and science, as art-chaeology. It also presents the fractals as a possible augmentative process in this hybrid strategy.

From the point of view of visual art, the augmentation is an additive method that enriches a picture in a rhetoric manner. Artistic reconstructions of the experiments in the form of re-enactments also produced a powerful immersive effect when immaterial heritage was presented in its original contexts. And finally, colors and textures created artistic compositions of great aesthetic and immersive value.

Fig. 15.16 Educational experiment

As was apparent from the field validations, it can be concluded that the approach we propose, a fractal-augmentative manner, acted as an efficient educational tool, in which the AR has played the role of an "agent". This "agent" provided contextual information, where the context was geographic, inertial or visual. This method can improve the understanding and retention of information and of the educational message.

From the application experimentation we can conclude that the augmentation of the contexts had a powerful impact on the observer, allowing a deeper understanding of immaterial heritage, and can be an educational and learning tool, as well as a method for future transmission. The complexity of the stored data collected from the archaeological record and archaeological experiments, combined with some artistic processes, gives Art-chaeology the opportunity to become a present-day working instrument for saving and transmitting immaterial heritage.

We can conclude that the augmentation itself can be an artistic process (i.e. ARt), with an, as yet still unexplored, art potential. The advantages of an application for smartphones and tablets is that it allows an experience of immersion and consequently of learning in the exact historical context and directly relates the observer to the archaeological record and immaterial heritage.

Acknowledgments The authors thank Dr. Vladimir Geroimenko for the kind invitation to contribute to this book, and Professor Andreea Hasnaş, Assistant Professor Alexandra Rusu and technician Elena Hăut (NUA) for their collaboration. Last, but not least our gratitude goes to Mr. Bogdan Căpruciu for his review of the English text.

The project was financed by an exploratory research grant PN II IDEI ("The Maps of Time. Real communities, virtual worlds, experimented pasts", Director Professor Dragoş Gheorghiu). Images by D. Gheorghiu.

References

Arth C, Schmalstieg D. Challenges of large scale augmented reality on smartphones, workshop ISMAR 11: enabling large-scale outdoor mixed reality and augmented reality basel, 26 Oct 2011 (2011).

Azuma RT. A survey of augmented reality. Presence: teleoperators and virtual environments 6, 4; August 1997. Malibu: Hughes Research Laboratories; 1997. p. 355–85.

Benford S, Giannachi G. Performing mixed reality. Cambridge, MA: The MIT Press; 2011.

Bimber O, Raskar R. Spatial augmented reality, merging real and virtual worlds. Wellesley: A. K Peters; 2005.

Bonde S, Houston S. Re-presenting the past. Archaeology through text and image. Oxford/Oakville: Oxbow; 2013.

Bradley R. Image and audience. Rethinking prehistoric art. Oxford: Oxford University Press; 2010.

Brogni A, Calwell DG, Slater M. Touching sharp virtual objects produces a haptic illusion. In: Shumaker R, editor. Virtual and mixed reality new trends. Berlin/Heidelberg: Springer; 2011. p. 234–42.

Brown CT, Witschey WRT, Liebovitch LS. The broken past. Fractals in archaeology. J Archaeol Method Theory. 2005;12(1):37–78.

Burghelea V, Melinescu A, Brăileanu A, Gheorghiu D, Lăbus A. The ceramics of the Chalcolithic Vădastra culture, key engineering materials. Euro Ceram VII. 2001; 206–13.

Butchart B. Augmented reality for smartphones – a guide for developers and content publishers. JISC Observatory. 2011.

Chandler D. Semiotics. The basics. Abington: Routledge; 2007.

Clifford J. On ethnographic allegory. In: Clifford J, Marcus GE, editors. Writing culture. The poetics and politics of ethnography. Berkeley/Los Angeles/London: University of California Press; 1986.

Craig AB, Sherman WR, Will JD. Developing virtual reality applications. Burlington: Morgan Kaufman; 2009.

Ede S. Strange and charmed. Science and the contemporary visual arts. London: Calouste Gulbenkian Foundation; 2000.

Geroimenko V. Scope, cabinet exhibition, peninsula arts gallery, 14 May–25 June. http://www.geroimenko.com/Scope-Augmented-Reality-Artwork-at-Cabinet-Exhibition 2011. Accessed 1 Dec 2013.

Geroimenko V. Four key words lost in augmented reality: a VR-based digital photo painting with a hidden AR object. In: 16th international conference information visualisation, Montpellier. http://www.geroimenko.com/Four-Key-Words-Lost-in-Augmented-Reality-D-ART-Online-Gallery-France-July-2012-June-2013 (2012). Accessed 1 Dec 2013.

Gheorghiu D. Le projet Vadastra, Prehistorie Européenne. Liège: Université Libre de Bruxelles; 2001. p. 16–7.

Gheorghiu D. Art-chaeology. A sensorial approach to the past. Bucharest: UNArte; 2009a.

Gheorghiu D. De l'objet à l'espace: Une expérience art-chéologique de la préhistoire. Etudes Balkaniques (Cahiers Pierre Belon 15), Paris; 2009b. p. 211–24.

Gheorghiu D. A study of art-chaeology, Centro Studi Archeologia Africana, Archeologia Africana – Saggi occasionali 2005–2009, (11–15). Milan; 2009c. p. 45–50.

Gheorghiu D. Experimenting with prehistoric spaces (Performance, experience, evocation). In: Nash G, Gheorghiu D, editors. The archaeology of people and territoriality. Budapest: Archaeolingua; 2009d. p. 235–54.

Gheorghiu D. The technology of building in chalcolithic southeastern Europe, p. 95–100. In: Gheorghiu D, editor. Neolithic and chalcolithic architecture in Eurasia: Building Techniques and Spatial Organisation. Proceedings of the XV UISPP World Congress (Lisbon, 2006 Sept 4–9)/Actes du XV Congrès Mondial (Lisbonne, 2006 Sept 4–9), Vol 48, Session C35, p. 95–100. BAR International Series 2097. Oxford: Archaeopress; 2010.

Gheorghiu D. Metaphors and allegories as augmented reality. The use of art to evoke material and immaterial objects. In: Back-Danielsson I-M, Fahlander F, editors. Encountering imagery. Materialities, perceptions, relations, Stockholm studies in archaeology, vol. 57. Stockholm: Department of Archaeology and Classical Studies, Stockholm University; 2012a. p. 177–86.

Gheorghiu D. eARTh vision (Art-chaeology and digital mapping). World Art. 2012b;2(2):211–7.

Gheorghiu D, Children G, editors. Experiments with past materialities, British archaeological reports international series 2302. Oxford: Archaeopress; 2011.

Gheorghiu DS, Ştefan L. In between: experiencing liminality. In: Aceti L, Rinehart R, editors. Not here, not there. Leonardo Electron Alm;19(1). Istanbul: Sabanci University; 2013a. p. 44–61.

Gheorghiu D, Ştefan L. The maps of time project: a 4D virtual public archaeology (poster). In: 19th EAA annual meeting 2013. Pilsen, Czech Republic, 4th–8th Sept 2013; 2013b.

Huys V, Vernant D. L'Indisciplinaire de l'art. Paris: Presses Universitaires de France; 2012.

Ifantidis F. Archaeographies. Excavating neolithic dispillo. Oxford: Archaeopress; 2013.

Karlekar J, ZhiYing Zhou S, Lu W, Nakayama Y, Hii D. Mixed reality on mobile devices. Singapore: Interactive Multimedia Lab., Dept. of ECE National University of Singapore; 2010.

Mandelbrot BB. The fractal geometry of nature (Updated and augmented edition). New York: W. H. Freeman; 1983.

Mandelbrot B. interviewed by Anthony Barcellos. In: Albers DJ, Alexanderson GR, editors. Mathematical people: profiles and interviews. Wellesley: AK Peters; 2008. p. 213–34.

Mateescu C. Contribution to the study of Neolithic dwellings in Romania. A dwelling of the second phase of the Vadastra culture. Dacia NS. 1978;XXII:65–71.

Mathieu JR. Introduction: experimental archaeology. Replicating past objects, behaviors and processes. In: Mathieu JR, editor. Experimental archaeology. Replicating past objects, behaviors and processes, British archaeological reports international series1035. Oxford: Archaeopress; 2002. p. 1–12.

Milgram P, Kishino AF. Taxonomy of mixed reality visual displays. IEICE Trans Inf Syst, E77-D (12). 1994. p. 321–1329.

Mullen T. Prototyping augmented reality. Indianapolis: Wiley; 2011.

Papagiannakis G, Schertenleib S, O'Kennedy B, Arevalo-Poizat M, Magnenat-Thalmann N, Stoddart A, Thalmann D. Mixing virtual and real scenes in the site of ancient Pompeii. Comput Anim Virtual Worlds. 2005;16(2):11–24.

Paul C. Digital art. London: Thames and Hudson; 2011.

Pink S. The future of visual anthropology. Engaging the senses. London/New York: Routledge; 2006.

Reid J, Geelhoed E, Hull R, Cater K, Clayton B. Parallel worlds: immersion in location-based experiences. Proceedings of the SIGCHI conference on human factors in computing systems, New York; 2005. p. 1733–6.

Renfrew C. Figuring it out. The parallel vision of artists and archaeologists. London: Thames and Hudson; 2006.

Suderburg E. Introduction: on installation and site-specificity. In: Suderburg E, editor. Space, intervention. Situating installation art. Mineapolis: University of Mineapolis Press; 2000. p. 1–22.

Tyler S. Post-Modern ethnography. From document of the occult to occult document. In: Clifford J, Marcus GE, editors. Writing culture. The poetics and politics of ethnography. Berkeley/Los Angeles/London: University of California Press; 1986. p. 122–40.

Vico G. The new science. Ithaca: Cornell University Press; 1744. 1968.

Vlahakis V, Ioannidis N, Karigiannis J, Tsotros M, Gounaris M, Stricker D, Gleue T, Daehne P, Almeida L. Archeoguide: an augmented reality guide for archaeological sites. IEEE Comput Graph Appl. 2002;22(5):52–60.

Wagner D. History of mobile augmented reality. Christian Doppler Laboratory for Handheld Augmented Reality, Graz University of Technology, Austria; 2005.

Zubrow EBW. Fractals, cultural behavior, and prehistory. Am Archeol. 1985;5(1):63–77.

Chapter 16
Spatial Narratives in Art

Simona Lodi

16.1 Introduction

A whole new scene is emerging. Starting with the question: if the concept of data-space has become a paradigm for contemporary society, what are the implications for art? The works of artists who use augmentation, information and immersion in specific contexts—public or private spaces— have the goal to create interventionist actions and collective experiences within an experimental augmented framework. These artists play on ambiguities in defining what reality is—how it is perceived, felt and detected. The aim of the analysis is to understand socio-cultural transformations in the fields of art and technology in social space, and what new forms of aggregation and participation have developed, providing an opportunity to reflect on new concepts of democracy that are emerging in our global saturated media age.

Recently Gibson described things this way: "Cyberspace has everted. It has turned inside out. Colonized the physical." (Gibson 2010)

Let's begin with the symbolic work "The Apparition of the Unicorn, Pink and Invisible at the Same Time" by the artist collective Les Liens Invisible, in which "Art overtakes Faith in imagination." (Les Liens Invisible 2011) (see Fig. 16.1).

These prankster artists took the phenomenon of web-based parody religions to produce a humorous intervention that breaks the law at the same time. Using augmented reality, they brought about an event that people on the Internet had long been waiting for: the apparition of the Invisible Pink Unicorn, a legendary figure that first appeared on the Net in the early 1990s as an eminent deity to satirize theistic belief. In the words of Steve Eley "Invisible Pink Unicorns are beings of

S. Lodi (✉)
Share Festival (Turin), Art Critic and Curator, Turin, Italy
e-mail: simona.lodi@toshare.it; http://www.toshare.it

V. Geroimenko (ed.), *Augmented Reality Art: From an Emerging Technology to a Novel Creative Medium*, Springer Series on Cultural Computing,
DOI 10.1007/978-3-319-06203-7_16,

Fig. 16.1 A screenshot of *The Invisible Pink Unicorns*, 2011, Les Liens Invisible, augmented reality, copyright Les Liens Invisible. Description: *The Invisible Pink Unicorn* is suspended in air over the Vatican Obelisk

great spiritual power. We know this because they are capable of being invisible and pink at the same time. "(Huberman 2007) The goddess made her appearance as a cyber-monument in Saint Peter's Square in Rome on April 23—Easter Day—2011. The work demonstrates the illegal, unauthorized use of public space. Perhaps not everyone knows that the eponymous square in front of Saint Peter's Basilica is not located on Italian territory, as the Vatican City, home of Pope Francisco I, is an independent state. It is also an undemocratic state, where protests and demonstrations of any kind are strictly forbidden, a situation guaranteed by tight security.

The Invisible Pink Unicorn was chosen by the artists because it had become a rallying point for activists, and in a certain sense 'illegal'.

Les Liens Invisibles' "ubiquitous monument" has prompted "an eternal reshape of the Eternal City," as the Internet everts out of itself and into reality. "A Monument to the Invisible Pink Unicorn—which is a work and symbol of atheism, fervid imagination and hope—has been permanently placed in the middle of the square and all the passersby can now admire it through the comfortable viewer of their smart-phones freely installing the popular Layar AR application." (see Fig. 16.2).

According to the authors, "the Invisible Unicorn is not a joke and it won't be removed it from its current position. The virtual sculpture is 'real', (in)visible and it has to be taken into serious consideration: it is the way a recontextualized symbol

Fig. 16.2 A screenshot of *The Invisible Pink Unicorn*, 2011, Les Liens Invisible, augmented reality, copyright Les Liens Invisible. Description: One view St. Peter's Square of Rome during the apparition of *The Invisible Pink Unicorn*

can alter, challenge and reshape the perception of a public space—especially a very closed and symbolic one like the [*sic*] St. Peter's Square in Rome" (Les Liens Invisible 2011).

16.2 The Problem of Squatting in Space

Exploring the issue aroused by using AR technologies as "site vs. non-site," "materiality vs. immateriality" or ubiquity of an art that is "not here, not there" brings us to the topic of representation in art.

With the birth of net.art, the Web began to be used as the space *par excellence* for all that was immaterial, encouraging new directions in art focused on the real versus the virtual. "The 1990s were about the virtual. It started with the media obsession with Virtual Reality (VR). It is quite possible that this decade of the 2000s will turn out to be about the physical—that is, physical space filled with electronic and visual information" (Manovich 2005). Since 2002, Lev Manovich has traced the development "of the technologies which deliver data to, or extract data from, physical space—and which already are widely employed at the time of this writing (early 2002/2005)." (ibidem) Manovich thus turns the crux of the matter on its head; the point is not technology but space, and the definition of art that overlays and occupies that space.

What impact does this style of art have on society and on the public? In what way does it appropriate public and private space? And in doing so what political issues does it raise and what participatory democratic processes does it activate?

William Gibson in a recent article writes: "Jeremy Bentham's Panopticon prison design is a perennial metaphor in discussions of digital surveillance and data mining, but it doesn't really suit an entity like Google." (Gibson 2010)

Manovich explains: "This close connection between surveillance and assistance is one of the key characteristics of the high-tech society. This is how these technologies are made to work, and this is why I am discussing data flows from the space (surveillance, monitoring, tracking) and into the space (cellspace applications, computer screens and other examples below) together." (Ibidem) It is easy to see that the heart of the matter lies in the definition of, or focus on, social space, or Augmented Space, as a specific characteristic of high-tech society.

Deriving the term from 'augmented reality,' Manovich refers to this new kind of space as "augmented space," which is becoming a reality and works very well. What is never explicitly mentioned, however, are the political implications that naturally arise from this overlaying of layers, made possible by tracking and monitoring users: "delivering information to users in space and extracting information about these users are closely connected. Thus augmented space is also monitored space." (Ibidem)

In response to this encroaching form of social control Clemente Pestelli and Gionatan Quintini, accepted Share Festival's invitation to produce the Special Project 2010 with their usual creative cheekiness. Specially designed for the sixth Piemonte Share Festival, the project mustered all the surreal and virtual imagination that lies at the centre of their work to invade Turin's urban environment. *R.I.O.T./Reality Is Out There* (Share Festival 2010) (see Fig. 16.3) was a series of urban strikes invisible to the naked eye—but for that no less tangible—using augmented realities that surround us every day. The public was invited to uncover the virtual sculptures through a game, a digital urban treasure hunt, and was treated to the sight of flying objects such as floating bananas, Facebook banners, revolutionary slogans, Space Invader icons and so on.

Deconstructing the natural association that has existed ever since the Stone Age between reality and the tools we build to control it, *R.I.O.T.* turns this relationship on its head by using reality as a tool, as a means through which we move to explore a universe visible only on our smart phones, creating a sort of paradoxical tourism. Setting their sights on augmented reality, or rather on the what the myth of 'augmented reality' appears to promise, the city of Turin was invaded by a series of imaginary installations squatting in key locations.

16.3 The System of Art Is Under Attack

Other projects with direct political connotations for the Art System have been organized by other artists. One very clever example was the virtual augmented reality show held on October 9, 2010 at the MoMA building in New York—only

Fig. 16.3 A screenshot of *Monument R.I.O.T*, 2010, Les Liens Invisible, augmented reality, copyright Les Liens Invisible and Share Festival. A view of Turin (IT) with one of R.I.O.T. works series

the MoMA did not know about it. The infiltration was organized as part of Conflux, the psychogeography festival (Skwarek and Veenhof 2010).

Sander Veenhof and Mark Skwarek, the two artists behind the invasion, extended to the public a 'cordial' tongue-in-cheek invitation to their temporary exhibition, adding a post scriptum that the MoMA itself was yet to be involved. Squatting in the halls of the MoMA in New York, the exhibition featured augmented reality art in its proper context: a contemporary art museum, showcasing the radical new possibilities and implications that augmented reality is bringing to the cultural and creative field. Over thirty artists took part in the "'art invasion' annex exhibition" (Ibidem), distributing their works on all the floors of the building and effectively taking over the MoMA. In the artists' statement, Veenhof and Skwarek attribute remarkable responsibility to a technology that allows provocation without the risk of arrest that graffiti artists face, even though they are not anonymous. They called it 'progression' in the field of art; depending on the way you look at it, it is artistic freedom or just plain illegal.

Space is expanding in terms of the information it holds, and is being augmented through the addition of media such as images, video, sound, music, words and data, which are introduced in space, but also captured within space (see Fig. 16.4). Augmented space is a space that is monitored and watched at the same time; it is a space in which users are tracked, where data is distributed but also extracted. In this context, the aesthetics of ubiquitous computing opposes art to virtual reality by

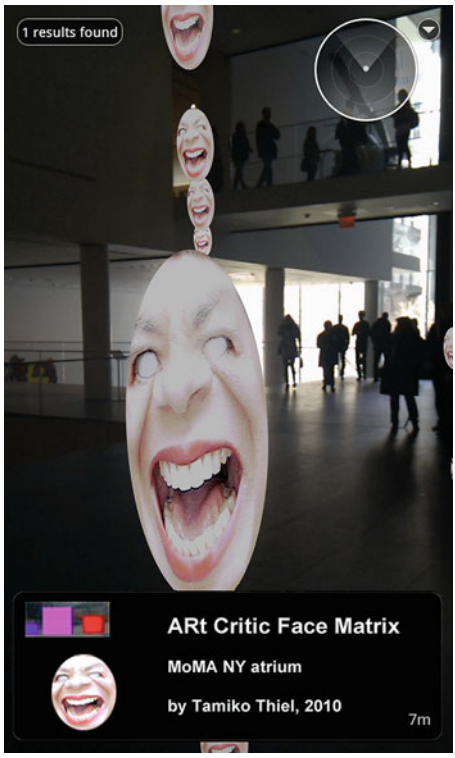

Fig. 16.4 A screenshot of *ARt Critic Face Matrix*, 2010, Tamiko Thiel, augmented reality, copyright Tamiko Thiel. Description: Thiel's work is exhibited in MOMA intervention by Manifest.AR

expanding on the digital and taking it into the physical dimension, in what we might call 'Spatial Art.'

As yet another label, 'Spatial Art' is hardly indispensible and will probably be short-lived as the never-ending hype of digital technologies and the derived continuous flow of newness and obsolescence. Nevertheless, it can help us reconstruct the narratives of certain specific artistic practices. Spatial Art overlays and unites several spaces into one, making artistic use of time, movement and data or information in a space defined by growth in technological interaction, i.e., a data-space. Spatial Art speaks to a public on the move, to a public that is mobile and not stationary, obliging us to realize that the media that we wear are part of the objects that make up our world (Bolter and Grusin 1999). In 2005, in the film "They Live", directed by John Carpenter (1988) special sunglasses revealed subliminal images and the real information underlying physical media (newspapers, billboards), in a reality augmented by messages of alien persuasion (obey, consume, watch TV, etc.). Today, additional layers of information are conveyed directly to people living in the *smart city*.

From an aesthetic point of view, the question of space is not new in art. Reaching out into the third dimension, into space, from a flat, two-dimensional canvas is a recurring theme throughout the history of art.

Nowadays the problem of bringing together two different spaces is conceived in much broader terms. Overlaying dynamic and contextualized data onto physical space brings change, dynamism, interactivity and multimediality. That is, how to introduce into an artwork those elements that characterize reality as the continuous flow of states that we perceive as change. The contrast between site and non-site, between the real and the virtual, between being here and there at the same time—the ubiquity of objects and images, the relationship between physical space and artworks—is a field widely explored by artists.

Every single place on Earth has coordinates that can be tracked technologically; every single space can be surveilled. As Korzybski put it, the map is not the territory—a concept later examined and developed by Bateson, though also explored by Borges in his well-known short story *On Exactitude in Science*. Maps today—spanning Google, GIS, GPS and the entire web itself, including games such as Foursquare and social networks, which themselves publish content in the form of maps, graphic data and infosthetics that are directly geolocalized, and hence are forms of territorial representation—have become activities and practices of socialization, interacting with social life. The result, as we have seen, is the illusion of living within a technological Panopticon in which it is no longer possible to dabble in any form of expression beyond control and outside of sovereignty: we ourselves produce the data that fulfill the contemporary paradigm of surveillance and control. By subjectifying the process of subjectification, biopolitics is self-generating (Foucault 2004). The technological Panopticon is an expression of augmented power that pervades from the inside out, constructed as a series of multiple power relationships. Through those power relationships, through the invisibility of control, the biopolitics of social control is applied.

From an aesthetic point of view, contributing to the architectural construction and maintenance of the network—the "social sculpture" of today quoting Beuys' "extended definition of art," later developed into the idea of "social sculpture" and his thoughts on how and whether art should interfere with politics. —has led artists to work in new fields that contain elements of new forms of participatory democracy. One example of this process started with the Invisible Pavilion.

The Invisible Pavilion was an uninvited, experimental, hallucinatory experience of augmentation, information and immersion in a specific context, involving the unauthorized use of public space, which squatted in the exhibition spaces of the 54th Venice Art Biennale (see Figs. 16.5 and 16.6). It was a performance involving the 'flow' of digital-based works of art, which filled the whole Giardini concourse where the national pavilions were located. Curated by Les Liens Invisibles and myself, the main purpose of the project was to augment the spaces of the Biennale with a stream of signs and symbols, in an attempt to emphasize how producing art is a state of flow in the 'always-on' age. The format used for inviting artists to contribute to the performance was also designed specially for the use of augmentation, information and immersion. Artists were not asked for 'one' piece from a collection but for a 'stream' of pieces, since the idea was not to use the augmented space to reproduce the same curatorial scheme as the visible Biennale. The Invisible Pavilion project

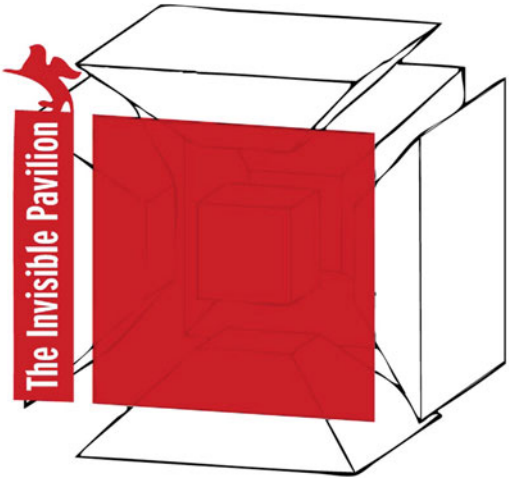

Fig. 16.5 A screenshot of *Invisible Pavilion*, Exhibition Logo, 2011, copyright Les Liens Invisible and Simona Lodi

Fig. 16.6 A screenshot of *Drug Box*, 2010, REFF—Roma Europa Fake Factory, augmented reality, copyright Roma Europa Fake Factory. Description: Invasion of the augmented reality Drug Box in the Giardini of 54th International Art Exhibition Venice Biennale

Fig. 16.7 A screenshot of *Show Me Your Digital*, 2011, IOCOSE, augmented reality, copyright IOCOSE. Description: this work is positioned in the entrance of the main boulevard of The Giardini as a stage curtains of 54th International Art Exhibition Venice Biennale

led to a new partnership with the artistic collective Manifest.AR and their Venice Biennale 2011 AR Intervention. Together a format was built that stepped up the interventionist component of the projects.

Nine artists—Artie Vierkant, Constant Dullaart, CONT3XT.NET, IOCOSE, Jon Rafman, Les Liens Invisibles, Molleindustria, Parker Ito, and REFF–RomaEuropa FakeFactory— were invited to contribute to the pavilion project, turning the Biennale space into a performance by providing a stream of works for the entire length of the exhibition (see Fig. 16.7).

Molleindustria is an Italian team of artists, designers and programmers, whose aim is to encourage serious discussion of the social and political implications of videogames. Their strategy is to involve media activists, net-artists, habitual gamers and detractors of videogames (see Fig. 16.8). Their intervention and contribution to the Invisible Pavilion targeted the Chinese Pavilion, after Chinese artist Ai Weiwei was arrested at Beijing Airport on April 3, 2011, while en route to Hong Kong. His arrest appeared to be part of a larger crackdown on democracy activists and dissidents.

Augmented Perspective references Ai Weiwei's series of photographs *Study of Perspective*, allowing visitors to superimpose the artist's one-finger salute onto the surrounding landscape. The Chinese Pavilion, it is known, was under the direct control of the Chinese government, leading Molleindustria to denounce

Fig. 16.8 A screenshot of *Augmented Perspective*, 2011, molleindustria, augmented reality, copyright molleindustria

Italian complicity with the Chinese dictatorship, stating, "While the international art community is mobilizing for the release of Ai Weiwei by pressuring Chinese authorities and demonstrating at embassies around the world, the Venice Biennale provides a central stage for government-endorsed Chinese art, becoming, de facto, an accomplice of this unacceptable attack on freedom of expression" (Molleindustria 2012).

For REFF—Roma Europa Fake Factory—"Defining what is real is an act of power. Being able to reinvent reality is an act of freedom (see Fig. 16.6). REFF promotes the dissemination and reappropriation of all technologies, theories and practices that can be used to freely and autonomously reinvent reality." (REFF 2011) This commitment is what led the artists to invent *REFF AR Drug*, an augmented reality drug combining three "very powerful molecules": *REMIXine*, "known to augment the total entropy of systems"; *REALITene*, whose "configuration is not determined in the lab, but is left to the shaping processes enacted by the patient and its surrounding context"; and last but not least, *REINVENTum*, "a compound that collaborates with the other molecules found in our drugs to reassemble components into new forms once their bonds have been disassembled."(Ibidem) According to the artists, the purpose of the drug is to treat biopolitical issues such as social depression, fear of the future, precariousness, anthropological distress, lack of opportunity, communication totalitarianism, scarcity of freedom and intolerant social ecosystems. It has yet to be launched on the market.

CONT3XT.NET is more conceptual in its work. Founded in January 2006 by Sabine Hochrieser, Michael Kargl, Birgit Rinagl and Franz Thalmair, this Vienna-based collective takes the idea of the 'context' as its starting point, to reflect upon the spatial, temporal, discursive and institutional framework in which contemporary conceptual artistic practices are grounded. For the Invisible Pavilion the collective produced *Blemish*, one of the most scheming and intriguing works streamed. As the artists explain, "The work *blemish* pursues the technological limitations of mediated

images by extinguishing single components of it. Ephemeral image vacancies are inscribed in the mobile display as a layer of defective pixels and can be read as an intervention in the technological conditions of devices that serve for the representation of reality by digital means. Equally, *blemish* is an intervention in the public space, giving priority to the context of the global art world as well as targeting the blind spots of its modes of production and representation. The unstable nature of reality as well as the contemporary methods of its reproduction is called into question: Which of the significant components of a digital product are visible, which are not? Which components of an overall image are not on display, deliberately or accidentally? Which of the many artistic formats appears in the canon of contemporary art, which of them are blanked out in the files of its operating system? The immaterial defect of form—a dead pixel—is inscribed in the auratic art spaces of the Venice Biennial. Barely perceptible for the viewers it is disguised as a loose arrangement of black squared errors which finally can be read as an abstract comment about the blemished context of art" (CONT3XT.NET 2011).

Constant Dullaart's *Invisible Watermark* and Jon Rafman's works *Pollock Tank, Georgia O'Keeffe Spinner* and *Matisse David*, forming part of the series *Brand New Paint Job*, have much in common with the 'New Aesthetic' theorized by James Bridle (Bridle 2011).

Lots of images made up of lots of pixels was the answer to a figurative approach to the New Aesthetic's reproduction of reality, questioning the unstable nature of the real world and the contemporary methods used for its digital reproduction.

Working on the Invisible Pavilion project for the 54th Venice Biennale, it so happened that we came across another group of artists working on much the same issue, so we decided to cooperate with them and launch a joint attack on the Biennale from different fronts and perspectives. In June 2011, the cutting-edge international cyberartist group Manifest.AR (MANIFEST.AR 2011) issued a statement to the general public and to the president and director of the 54th Venice Biennale informing them that they had created additional pavilions in the Giardini concourse, built in the new medium of augmented reality, and that some of the works had leaked out into the public space of Saint Mark's Square. The artists Mark Skwarek, Sander Veenhof, Tamiko Thiel, Will Peppenheimer, John Craig Freeman, Lily and Hong Lei, Naoko Tosa and John Cleater all took part directly in the project.

As Tamiko Thiel explains, "Augmented reality has redefined the meaning of 'public space.' As corporations privatize many public spaces and governments put the rest under surveillance, augmented reality artists take over the invisible but actual realm that overlays real space with multiple parallel universes. Augmented reality actualizes the metaverse in the real universe, merging the digital and the real into a single, common space.

> Augmented reality can conquer space but it is not indifferent to space. With my artworks you must negotiate real space in order to view the works. They are usually not single images or objects, but installations that surround you. In order to look at them you must move your body in space, looking up, down and twisting around (Thiel 2012).

Fig. 16.9 A screenshot of *Shades of Absence: Outside Inside*, 2011, Tamiko Thiel, augmented reality, copyright Tamiko Thiel. Description: In honour of artists, whether art world insiders or outsiders, who have been censored via threats of arrest or physical violence. Venice Biennale 2011 Intervention

In *Shades of Absence: Outside Inside,* Tamiko Thiel inserted into the closed curatorial space of the Giardini concourse in Venice the silhouetted figures of artists who have been threatened with arrest or physical violence (see Fig. 16.9). Regardless of whether they are outsiders or insiders to the Art System, known internationally or only within small circles, their work has excluded these artists from the safety of protected space (see Fig. 16.10).

28 is an artwork that is secret, or invisible or in some way a 'revelation' in space also takes on an aesthetic element shaped by the artist's being an outsider. The author Mariano Equizi has made a urban story telling based on augmented reality, a conspiracy and psychedelic novel on power and control . The Reader-Player-Explorator-Nomad will move around the city like a character from Paul Auster NYC trilogy.

The work 28 has a almost cinematic narrative dimension that is the newness of the project, overlaying and unites several spaces into one, making artistic use of time, movement and data or information in a space defined by growth in technological interaction in a data-space. 28 speaks to a public on the move, to a public that is mobile and not stationary, obliging us to realize that the media that we wear are part of the objects that make up our world. It is a conceptualization of a

Fig. 16.10 A screenshot of Tiananmen SquARed: Tank Man, 2011, 4Gentlemen, Location-based augmented reality, ©4Gentlemen. Description: "Tiananmen SquARed" is a two part augmented reality public art project and memorial, dedicated human rights and democracy worldwide

scenario akin to the world presented in the film "They Live", directed by John Carpenter. In that world, special sunglasses revealed subliminal images and the real information underlying physical media (newspapers, billboards), in a reality augmented by messages of alien persuasion (obey, consume, watch TV, etc.). Today, additional layers of information are conveyed directly to people living in the smart city.

28 is a secret casting set in the Italian Alphaville; Turin is also a famous esoteric city like Lione, Praga and San Francisco and one of the most innovative city (see Fig. 16.11). A perfect scenario for a cyber noir tale, a perfect place to hide secrets and puzzles. People find an invisible city, where daily surfaces hide a psychotronic story, fragmented in the city spaces. Intervention took place in symbolic locations around town, creating a hybrid event at the crossroads of digital art, urban space and hacking. Here, real and virtual space interact so as to create a single social environment, made possible ever since digital space became an integral part of the city itself. The game is therefore an urban hack, the reappropriation of public space via intervention directly on the streets, squares and roads, and under

Fig. 16.11 A screenshot of Komplex 28, 2013, Mariano Equizzi, Komplex, augmented reality, all rights reserved by Komplex. It used as trigger the facade of Turin, Lingotto. It's a perfect "screen" to create alteration in the architectural pattern in order to make an interesting pop-out of the clip

monuments, porticoes and buildings. It is action in the collective digital sphere to create an unexpected gulf, cultural jamming, a guerrilla attack on communication in the global city.

As a symbolic act, Marino Equizi's urban hack is really an aesthetic overexposure, an exercise in the subversive use of augmented reality, which becomes unreality, a vision, an augmented dream in subcultural practices. It is less about public space and more about destruction, interruption and aperture, in an effort to crack open standard mechanisms of closure (Fig. 16.12).

16.4 Conclusions

The problem of perpetual newness (Watz 2012).

The culture of ubiquitous information highlights the social peculiarities that can ensue. Mapped space overflows onto society, compelling contemporary artists to explore the relationship between art and social life, to find the intersection between the self and society, and to depict, directly and exhaustively, the features of the society in which they live. These artists represent contemporary thought in their way of representing ubiquity as a real condition of everyday life, transforming it

Fig. 16.12 A screen shot of *Map Installation*, 2010, Aram Bartholl, plywood, wooden beam structure, semigloss coating photo by Anne Fourès. Copyright Aram Bartholl. Description: Installation View of Google Maps point in physical public space

into symbols of rich cultural connotation. Ubiquity is a forceful display of the role that art plays in understanding a global world, where artworks reflect not only the artists' perspective on reality, but also shed light on our own experience of the world. We have looked at how and where the distinction between public and private space breaks down, at how new space and new territory for art is being opened up, at reactions to data-space. The concepts of art in public space, art as public space and art in the public interest have all changed, paving the way for a return of political activism in the social function of art. In this context, does it still make any sense to talk about public space and public art? Can we still speak of artistic universals?

The conclusions lie within the approach taken to the topic; an approach that is neither technological nor geographic, but rather driven by an interest in capturing the cultural climate and a certain psychological and anthropological dimension of our perception of public space, of overcoming limits, of the concepts of material/immaterial, visible/invisible, real/unreal. Set off against the artists and the exhibitions described in this paper are the museums, venues or sites that already exist. What we have is not the definitive story of a movement but rather an account

Fig. 16.13 A screen shot of *We Need Something*, 2012, Will Pappenheimer, location-based augmented reality iPhone screenshot, copyright Will Pappenheimer. Description: This work is located over Queens, NY during the manifestation days 'Occupy Wall Street' in 2012

given by a series of individual works and by continuous links to real and virtual situations. The conclusions are given by the account pieced together by artistic works that make use of those elements that characterize reality as the continuous flow of states that we perceive as changes in life and in the space we live in. The works are individual, shifting, subjective accounts, more from the point of view of an art world outsider than from an insider. This can be seen in Will Peppenheimer's *Skywrite AR: We Need Something,* which appeared virtually over Queens in New York throughout the Occupy Wall Street protests in 2012 (Fig. 16.13).

The game of claiming to be outside any official system or establishment is itself a strategy for earning oneself a role as spokesperson of dissent, while it is also interesting as an expression of artistic freedom. The framework of the exhibitions described is shaped by the continuous friction between the individualism of the artists and the institutional nature of the events they target. It all turns on an ambiguous division that is technically ironclad as it overlaps the problem of perpetual newness that augmented reality and the New Aesthetic express. Changes in public space have become manifest in the augmented power of biopolitics, in the critical analysis of ubiquitous computing, in the question of surveillance versus inverse surveillance, in freedom of speech, in the permeability of boundaries, in locative media, in developments in the political and social environment, in the Panopticon, in interventionism in the art system (such as the Venice Biennale and MoMA invasions), in issues of democracy and privacy, in the tracking and profiling of data flows underpinning the growth of a database culture. All these changes have contributed to the construction of a new digital identity—but is it an identity

that we really want? As this new identity shapes living conditions in urban and private life in the smart city, mobile communications and handheld devices are erasing our personal presence, shifting the focus of accessibility onto the issue of digital inclusion/exclusion. A conflict has emerged between the individual and the community which itself is cardinal to the Art System and world of galleries and museums, which is substantially market-based. In this way, Spatial Art reflects the constant tension between the multiplicity of individual artists and the organizational unity of the system in general. There is no other unifying thread for Spatial Art, and as an element even it, perhaps, is paradoxically absent. All we have are clips, words, floating objects, statements, made-up chemical formulas, fragments of non-narrative accounts, elements without structure. What would appear to emerge is, on the one hand, the figure of the artist as messenger and innovator of roles and meanings, championing an anti-establishment art; on the other, the artist as the teller of fragmented narratives of reality and immateriality. They are witnesses of a fundamental anthropological change because as artists they are outsiders to the art market and the system in general, taking on an ethical role on which their exhibitions are premised. Their standing outside the system in general makes them morally invincible and irreproachable, and if what they do is illegal, it means they are treading on fiercely contested ground.

Artwork that is secret, or invisible or in some way a 'revelation' in space also takes on an aesthetic element shaped by the artist's being an outsider to the Art System, to the world of art based on economic rather than cultural value. For mainstream art scenes, not producing for the market is ultimately the last real statement that the artist can make against the art world, a form of rejection of capitalism and its modes of production, which for some takes on an existential bent. These are artists who live in society and not in museums, who are in touch with social and political issues, which is why their art tends to revolve more around 'action' than around pieces of artwork. The picture is ultimately connected with the role and responsibility of the artist as a pioneer and critic, as a witness and as a futurologist in a certain sense—as a person who can bring about change even through simple, surreptitious gestures. This image of the artist may well be just a myth—but why reject it and the evocative appeal that it continues to command?

References

Bolter JD, Grusin R. Remediation. Understanding new media. Cambridge, UK: MIT Press; 1999.

Bridle J. The New Aesthetic, Really Interesting Group (blog), May 6, 2011, blog http://www.riglondon.com/blog/2011/05/06/the-new-aesthetic. Accessed 24 Apr 2012.

Carpenter J. They live, dir., (Alive Films, Larry Franco Production), 1988. Based on the short story *Eight O'Clock in the Morning* by Ray Nelson.

CONT3XT.NET, Blemish, May 30, 2011. The Invisible Pavilion, official website. http://www.theinvisiblepavilion.com/2011/05/30/pixelerror/. Accessed 21 Apr 2012.

Foucault M. Naissance de la Biopolitique: Cours au Collège de France, 1978–1979. Paris: Gallimard/Seuil; 2004.

Gibson W. Google's Earth, The New York Times, 31 Aug 2010. http://www.nytimes.com/2010/09/01/opinion/01gibson.html. Accessed 20 Apr 2012.

Huberman J. The quotable atheist: ammunition for nonbelievers, political junkies, gadflies, and those generally hell-bound. New York: Nation Books; 2007. p. 103.

Les Liens Invisibles, official website, The apparition of the unicorn, pink and invisible at the same time. April 24, 2011. http://www.lesliensinvisibles.org/2011/04/the-invisible-pink-unicorn-art-overtakes-faith-in-imagination/. Accessed 10 Apr 2012.

Manifest.AR, official website. http://www.manifestar.info/. Accessed 22 Apr 2012.

Manovich L. The poetics of augmented space, (CreativeCommonsAttribution-NonCommercial-NoDerivs2.5License, 2005), 1. www.manovich.net/DOCS/Augmented_space.doc/. Accessed 17 Apr 2012.

Molleindustria, official website. Augmented Perspective, 2012. molleindustria.org/augmentedperspective/index.html. Accessed 24 Apr 2012.

REFF. RomaEuropa FakeFactory, REFF AR Drug, The invisible pavilion (2011)

6th Share Festival, official website, R.I.O.T./Reality Is Out There, 2010, http://www.toshare.it/?page_id=2923&lang=en. Accessed 24 Apr 2012; Les Liens Invisibles, official website, R.I.O.T./Reality Is Out There, http://www.realityisoutthere.net/. Accessed 24 Apr 2012.

Skwarek M, Veenhof S. We AR in MoMA, Conflux Festival official website. http://www.confluxfestival.org/projects/conflux-festival-2010/we-ar-in-moma/. Accessed 24 Apr 2012.

Thiel T. e-mail massage to author, April 18, 2012.

Watz M. The problem of perpetual newness. In: Julia Kagansky, editor. In response to Bruce Sterling's 'Essay on the New Aesthetic', The Creators Project (blog), April 6, 2012. http://thecreatorsproject.com/blog/in-response-to-bruce-sterlings-essay-on-the-new-aesthetic/#3 (2012). Accessed Apr 2012.

Chapter 17
Shifting Perceptions – Shifting Realities

Margaret Dolinsky

17.1 Introduction

As an artist working in a practice of portraying psychic dilemmas, I am interested in perception, portraiture, how dilemmas express themselves and how the thoughts and events fueling dilemmas reconstruct reality. Virtual objects offer a methodology for shifting perception and evoking a sense of other-worldliness that allows us to cognize our perceptions, their shifts and affectations.

The placement of 3D computer graphical imagery in virtuality and in space, across time so that one can revisit it anew -is an act of situating consciousness. Augmented reality incorporates the act of placing computer generated imagery in locative space for visitors to discover. AR is an experiential phenomenon that must be positioned and subsequently located or discovered. AR is fleeting as it is oscillating between being invisible and being made visible by situating the body and pointing a device into the atmosphere. The computing device, a data processor, a thinking machine, recognizes an artificial entity and unveils its presence. The physical movement of the body in synchronicity with the device combines the corporeal and the machine to produce a virtual entity. A visitor recognizes the AR entity in the viewing device and perceives it as an articulation between self and world. One must suspend their disbelief in order to integrate the virtual information within the real environment. In turn, the apperception of the AR object causes one to reconstruct their understanding of the presence of objects within that space. Moreover, direct confrontation and assimilation with the virtual causes the repositioning of physicality and acclimatizes neuronal activity. As a result, the real world transforms into an augmented reality.

M. Dolinsky (✉)
HR Hope School of Fine Arts, Pervasive Technology Institute, Institute of Digital Arts and Humanities, Indiana University, Bloomington, IN, USA
e-mail: dolinsky@indiana.edu; http://www.dolinsky.fa.indiana.edu/

V. Geroimenko (ed.), *Augmented Reality Art: From an Emerging Technology to a Novel Creative Medium*, Springer Series on Cultural Computing,
DOI 10.1007/978-3-319-06203-7_17,

17.2 Perceptual Shifts

The creation of AR situations requires a methodology of a creative process for exposing art motifs and formulas, exploiting locative space and generating experiential discovery in order to situate consciousness (Dolinsky 2004). The aesthetic moments in an AR experience are multi-layered ascertainments of locative spaces, artistic designations and psychic dilemmas. It is in the process of locating the artwork and identifying its existence that generates experiences that are geographical, corporeal and subjective. A confrontation with AR combines the experimental moment with conscious awareness and offers a shift in perception. Offering heightened awareness, this sensation becomes an extra-marginal moment in an intellective engagement, or a perceptual shift (Dolinsky 2004).

A perceptual shift is the cognitive recognition of having experienced something extra-marginal, on the boundaries of normal awareness, outside of conditioned attenuation. Promoting a "perceptual shift" for the visitor is a historical tradition in some art forms that aim towards altering perception. Perceptual shifts are often provoked by such art as *trompe l'oeil,* Cubism, Cornell boxes, labyrinth gardens, and Brecht's political theater. These motifs are a reason that I exploit AR as a virtual environment. As a type of interactive media, AR has a quality that requires a specific engagement unique to the peripheral devices and its ability to situate particular artistic performances. Once the visitor becomes complicit in his or her role within that interaction relationship, possibilities are expanded for cognitive recognition and perceptual shift. In my work, I am not necessarily attempting to shape emotion in particular, but I do hope to shape perceptual possibilities within environments by situating AR experiences.

The most important performance measure of effectiveness for media experiences is psychological immersion. Psychological immersion occurs when a visitor's senses are so aroused by the virtual experience that their emotions and intellect react as if they are in the actual world or participating in another world event (Rosen et al. 1994). We are most familiar with this phenomenon as we tend to weave ourselves into the plot of a film or the drama of a video game. AR art offers a sense of immersion when a locative activity engages the visitor in transforming a seemingly neutral, albeit public space into a subversive and aesthetic communication scene.

AR art allows us to incorporate virtual objects into our physical space and promote psychological immersion by repositioning our body's physical relationship to the world and moreover, affecting our emotional thinking. As a result, AR can restructure mundane existence. In AR, we must construct an understanding of how the 3D computer graphical object consummates with our world. Through psychological immersion, we gain an understanding of how we function in relation to its ubiety. We consider rules that were previously transparent and permutate them to orchestrate a shared sense of augmented reality. The integration of imaginative virtual art objects in public spaces not only gives us the opportunity to experience an "other" type of "being" in the world, the space itself exists as both real and

virtual (Virilio 2002). This recognition of the transformative environment allows us to reconsider representations in our everyday world and our own relationships to them (Dolinsky et al. 2005).

In order to achieve psychological immersion, action is key. Interactivity is critical for optimized enjoyment. Action enhances the sense of immersion and the efficacy of the graphics. Standing alongside the AR in the park and confronted by a man, I remained immersed within an augmented environment. The resultant conversation occurred with me in the virtual world and him in the park world. Our thoughts were dove-tailing in a strange manner but we seem to understand one another all the same. Our actions- our physical proximity and our dream like descant-intensified the immersion of the space for both of us. Somehow, we stood our ground and stood together while we enjoyed our conversation. We were listening to one another, engaged in a discursive reaction and ultimately we established our private interconnected network. We were immersed. Immersion can occur between one person and the AR object as I experienced the magic of the initial discovery of the artwork. Immersion can also occur between multiple persons who are acting in relation to the existence of the AR artwork as in when the interlocutor began our conversation.

This psychological connectedness of immersion occurs when there is an emotional response to the AR system. This is gauged by the sense of presence. The efficacy of presence can be formulated in different ways. Typically, presence is defined by a sense of being in the virtual environment instead of being in the space where the physical body actually resides (Draper et al. 1998; Slater and Wilbur 1997). Another definition of presence occurs when the experience is "... tantamount to successfully supported action in the environment" (Flach and Holden 1998; Zahorik and Jenison 1998). AR can offer a multiplicity of types of experiences. The former occurring in my initial situation with recognizing my AR art. I became a part of a magical moment that fused me with the existence of the object in a virtual space. My heart was racing in reaction to seeing it. I was mesmerized by the movement of the balloon hovering in the air. I felt impressed and immersed. The latter type of presence depends on action that locates one in the virtual environment. This occurred with the AR art when it became a part of my physicality in conversation with another person, even though they did not realize it was there. I felt its presence.

By focusing attention, shifting perception, and directing consciousness, the AR objects become a type of locative ink mark that combines with the environment to lead to a type of virtual painting or aesthetic overlay integrated into the real world. The objects can be realized as creating a virtual environment and establishing the action of a theatrical moment. The visitor has the responsibility to inculcate their degree of presence and assimilate the object accordingly. In effect, the creative process situates consciousness and augments reality by incorporating AR art into the active experience of locative awareness.

"The phenomenon of presence is based on the transportation of consciousness into an alternate, virtual reality so that, in a sense, presence is consciousness within that virtual reality" (Sanchez-Vives and Slater 2005). So despite an object being

simulated and not real at all, visitors can respond as if it is real by eliciting an emotional response and genuinely engaging with the virtual object. According to Dixon, "Virtual reality is all about illusion. It's about computer graphics in the theater of the mind. It's about the use of technology to convince yourself you're in another reality . . . " (Dixon 2007).

17.3 A Moment in the Park

A young skateboarder rolling past circled several times and slowed down long enough to ask "Is that a computer?" I was surprised by the question, perhaps some people do not know what this iPad is. I felt like an alien, holding an alien object, rendering myself an outlander and alien in the world. It was a surprised considering we were practically on campus. Regardless, standing searching, the computer looking up at a tree saw an illusion of a heart-shaped object. The balloon with the image of Lenin raising his finger is pointing towards the sky. The balloon is there! Lenin is there! Suddenly my heart was pointing to the sky . . . It is the arOCCUPY May Day exhibition and the heARt looms with a sense of vulnerability (see Fig. 17.1).

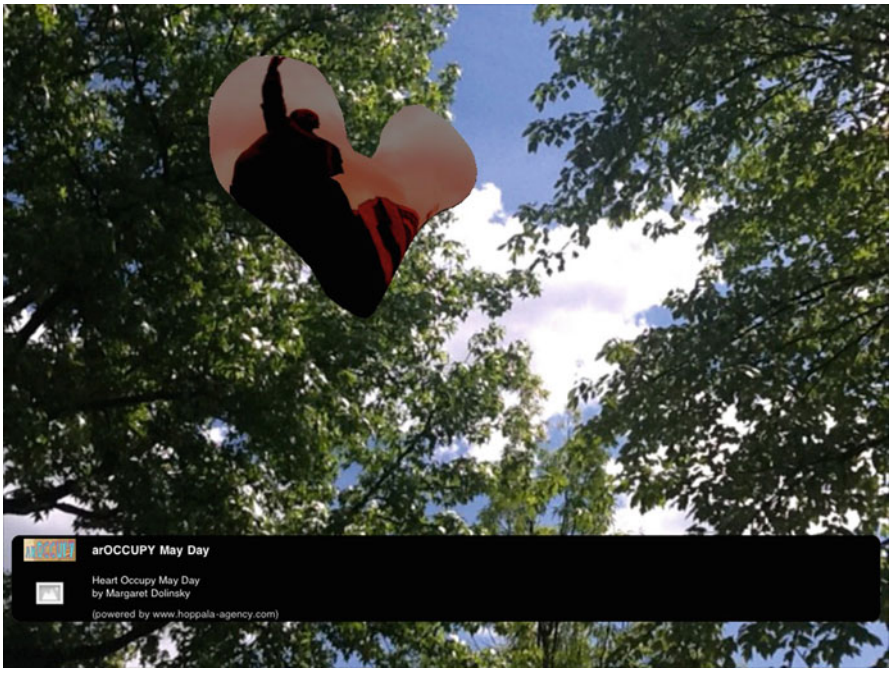

Fig. 17.1 HeARt arOCCUPY May Day 2013. Bloomington, Indiana, USA

Then, suddenly, out of nowhere, someone moves adjacent to my shoulder. With a slight swivel of my face, a warm breath pulses against my cheek. Turning completely, he comes into view. His breath reaches into my mouth like an ominous shadow rolling across a plain. Simultaneously, his voice is a soft growl and a matter of fact Indiana-Southern style whisper: "You're scaring people."

Alongside marking the scene with AR is now a newfound sense of trouble. To be certain that trouble is accompanied with alarm, the man repeats himself. Taking stock of the situation in the People's Park, a place where transients come to linger during the day, I see the world continues to pass by. Now someone-namely me-from that world passes into the park, space invades alongside AR art and brandishes a computer device in the air. Clearly such swashbuckling antics are not appreciated. Perhaps it is the computer that concerns them: an object waving around, a screen exploring the environment and a stranger creating an unknown quiddity. The people in People's Park feel screened. I am a surveyor that is being subject to surveillance.

We look straight ahead, nearly nose to nose, eyes in essence touching. His sunburned skin, long hair and military garb appears war town and weather beaten. He stands not much taller and he means business. He repeats himself, "You're scaring people." I do not move. My body is still as my mind registers standing close to this stranger. Our locked gaze continues, I reply softly, "I'm not scaring' anyone. I'm looking for my heart." Immediately his body relaxes, he withdraws ever so slightly, makes a bow and returns to me. Moving in close, he replies, "Well, I'm looking for my heart too." We began to have a consensual hallucination in a conversation of soul quest, symbolic language and sententious poetry. We each profess a type of pronunciamento regarding hearts. Two disparate sensibilities dovetailing around one another through conversation and confrontation and summing up with a profound sense of moment and place. It helps to further understand crazy. Contemporaneously, the discourse makes perfect sense and broken nonsense but ends in mutual satisfaction. It ends as if there exists a private acquiescence to recognize a heart when it is presented.

17.4 Subversive Confrontation

The discovery of AR artwork in a People's Park situates the visitor not only in a location but within a social structure that is transforming with both particular and random circumstances. The community transubstantiates the public area creating an ever changing dynamic established by a flow of situations. The AR experience is situated not for this marginalized group of people but those who travel there in order to recognize the affordances of the computer graphics as presence, action and relationships intrinsic to the reconfiguration of reality by the introduction of virtuality. Ascott states that "virtual reality corrupts and absolute reality corrupts absolutely, whenever the constraints and limitation of its construction are preordained, predefined or pre-set." The search for AR art is a search for the definition

of the space. One must begin to negotiate the space with an intrepid sense of exploration. One begins by searching the space slowly and more intimately than one would who is not brandishing a device. The AR visitor becomes aware of the space to discover the AR art but in turn may realize how fully present in the space we can become.

We can intensify our worlds experientially through an act of discovery with AR. AR systematizes Lenin as he hovers over People's Park in a heart shaped computer generated hallucination. Lenin becomes visible through a device and digital window that situates him towards the visitor in a relationship wrought with multiple interpretations of private, public and social identities. The visitor is being fused in a subversive confrontation with a virtual object that references a history of social systems in a place called People's Park, a circumstantial public space. The majority of the visitors to the park are among the AR uninitiated and will never know of the heart's existence. Through an adventure in search of AR art, comes a way of knowing a city, a neighborhood park, and its inhabitants. Moreover, AR upheaves a mundane occurrence in a park. By repositioning the visitor in the park with Lenin's effigy a distance forms between the sense of self and the park. AR causes the visitor to recognize the existence of the object, assimilate the object with not only space but self and form a reaction. The reaction modifies self, park and self with art. Step by step beginning with an invitation to discover the AR, the visitor finds a way to identify the work and identify with it alongside the streets. Each of the elements of this process intertwine one with another to create an experience of multiplicity and action that involves space – artistic space, cyberspace, and mental space. Virtual reality enhances reality (see Fig. 17.2).

The visitor becomes complicit in the AR artwork by attending its exhibition in the park. The visitor is yet another object, hovering among with virtual entities, recognizing the existence of other objects. The visitor, through the act of visiting, becomes the augmentation of the day. The visitor becomes the extra entity that affords discovery and assimilation for the regular inhabitants of the park. AR and its acolytes are shifting the reality and the perceptions of the people in the park. Those who visit AR have the potential to be labelled as an outsider and to become suspect in their activity.

The irony compounds itself as these events occur on May Day. May Day coincides with International Workers' Day and typically involves rallies and peaceful demonstrations in support of laborers and labor rights. On May Day 2013, there were two different demonstrations occurring in the People's Park. One demonstration was the exhibition of AR art and the other was the demonstration by the people who rallied to complain about the presence of a stranger, specifically the AR acolyte in the park.

"arOCCUPY May Day" was an AR art exhibition and subversion directed and produced by Mark Skwarek, a faculty member and researcher-in-residence at Polytechnic Institute of New York University. Inspired by New York City's Occupy movement, Skwarek re-built the encampment in AR. He extended the encampment by inviting artists to create AR pieces that would enhance efforts to support the Occupy Movement. AR allowed him to situate the protest in cities across the United

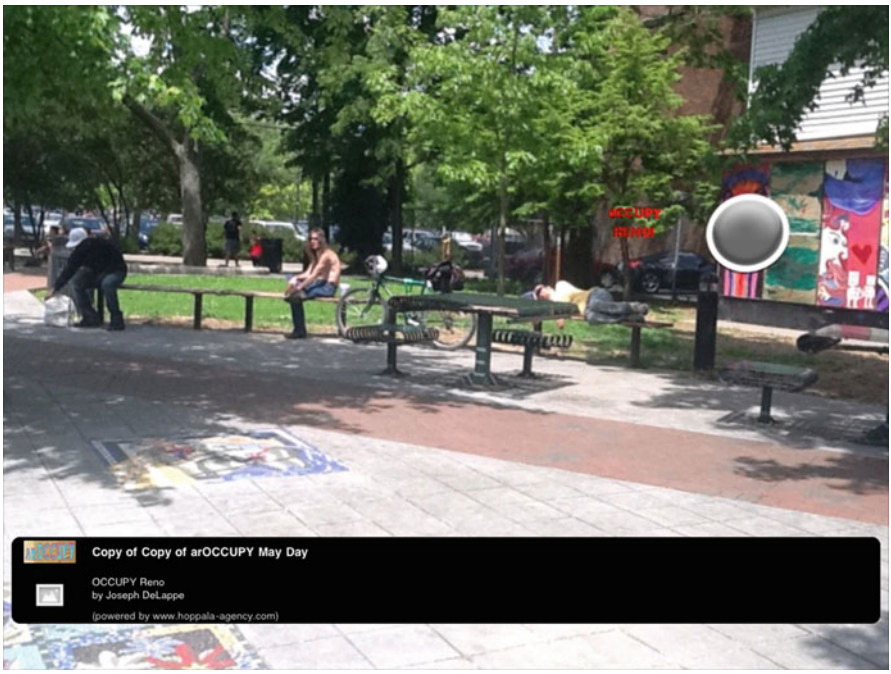

Fig. 17.2 People's Park in Bloomington Indiana during the art exhibition, arOCCUPY May Day 2013. Many of the people gathered to the left side of the park when they saw a stranger in the park walking around pointing an iPad. As a result, the benches and tables on the right side of the park are empty. The upheaval in the air can be seen literally, figuratively and virtually with the hovering AR objects

States as well as across the world in such cities as Sydney, Australia, Brasilia, Brazil and Hammam Sousse, Tunisia in Africa. The exhibition reached as far as Shanghai and a photo was smuggled out of China in support (see Fig. 17.3) (Skwarek 2012).

Lenin is being reintroduced to a new generation of social activists (Žižek 2002, 2004; Kellogg 2014) through reprints of his critical writings composed from the overthrow of the tsar. The choice of using the image of Lenin on the arHEART is motivated by a Ukrainian heritage. The Ukrainians were an independent nation in 1917 that was invaded by Lenin's Red Army. By 1921, Lenin began to give the Ukrainians back some of their independence by allowing a national revival movement that celebrated their customs, language, arts, music, poetry and the Ukrainian Orthodox religion. However, this was short lived when the Ukraine was devastated in 1929 by Stalin who imprisoned and/or executed leading scholars, scientists, cultural and religious leaders by falsely accusing them of armed revolt. This was followed by the Holodomor, Stalin's forced extermination by hunger in 1932–1933. The arHEART at arOCCUPY MAY DAY is a testament to the strength of heart of the Ukrainian people. The ephemerality of the arHEART is a pointer to the extreme changes of heart that the Russian leaders demonstrated towards

Fig. 17.3 Documentation from Shanghai arOCCUPY MAY DAY of the HeARt. This was a very difficult photograph to secure and was sent to the USA from Shanghai, China during the May Day worldwide protests. Photographer unknown

the Ukrainians. As a result the arHEART flutters in many cities, in the air, in the park and in the sanctuary of nature, pointing towards a place of renewal (see Fig. 17.4).

The creation and placement of AR art is integral to provoking an experience and causing a shift in perception. Conception, presence and communication is established through an aesthetic juncture. Placing the object in a particular setting co-locates aesthetic production, social milieu and subversive confrontation. AR affords an opportunity for an experience that facilitates an earnestness of space and place in the community. AR artwork helps to establish a relationship to city, alters that space and invites spectacle. That experience situates consciousness and forms memories of the artwork that reconfigures the self, the object as a place and the overall location.

Fig. 17.4 HeARt arOCCUPY May Day nestled in the trees of Bloomington, Indiana

References

Dixon S. Digital performance: a history of new media in theater, dance, performance art, and installation. Cambridge: MIT Press; 2007. p. 365.

Dolinsky M. Visual navigation structures in collaborative virtual environments. In: Stereoscopic displays and virtual reality systems XI, proceedings of international society of optical engineering's electronic imaging science and technology technical conference: the engineering reality of virtual reality. San Jose; 2004.

Dolinsky M, Anstey J, Pape D, Aguilera J, Kostis H, Tsoupikova D, Sandin D. Collaborative virtual environments art exhibition. In: Stereoscopic displays and virtual reality systems XII, proceedings of international society of optical engineering's electronic imaging science and technology technical conference: the engineering reality of virtual reality. San Jose; 2005.

Draper JV, Kaber DB, Usher JM. Telepresence. Human Factors: The journal of the human factors and ergonomics society. 1998;40(3):354–75.

Flach JM, Holden JG. The reality of experience: Gibson's way. Presence Teleoper Virtual Environ. 1998;7(1):90–5.

Kellogg P. Slavoj Zizek's failed encounter with Leninism. Links. Available at http://links.org.au/node/1500 (April 2010). Accessed 2 Jan 2014.

Rosen S, Bricken W, Martinez R, Laurel B. Determinants of immersivity in virtual reality: graphics vs. action. In: Proceedings of the 21st annual conference on computer graphics and interactive techniques SIGGRAPH '94. ACM, New York; 1994. p. 496. doi:10.1145/192161.192303, http://doi.acm.org/10.1145/192161.192303

Sanchez-Vives MV, Slater M. From presence to consciousness through virtual reality. Nat Rev Neurosci. 2005;6(4):332–9.

Skwarek M. arOCCUPY MAY DAY. http://aroccupymayday.blogspot.com/ (2012). Accessed 15 Dec 2013.

Slater M, Wilbur S. A framework for immersive virtual environments (FIVE): speculations on the role of presence in virtual environments. Presence Presence-Dev Virtual Environ. 1997;6(6):603–16.

Virilio P. The Aesthetics of Disappearance. In: Spiller N, editor. Cyber Reader: Critical writings for the digital era. New York: Phaidon Press Limited; 2002. p. 91.

Zahorik P, Jenison RL. Presence as being-in-the-world. Presence Teleoper Virtual Environ. 1998;7(1):78–89.

Žižek S. Revolution at the gates: a selection of writings from February to October 1917. New York: Verso; 2002.

Žižek S. What is to be done (with Lenin)? In: These times, 28 6. Available at http://www.inthesetimes.com/article/135/what_is_to_be_done_with_lenin/ (2004). Accessed 2 Jan 2014.

Chapter 18
Wearable Apocalypses: Enabling Technologies for Aspiring Destroyers of Worlds

Damon Loren Baker

18.1 Introduction

While Art is the most fundamentally creative human activity, it is my contention that artists themselves have more to gain out of breaking worlds than in building them. To clarify (and to head off any fears that I am calling for acts of mere terrorism or genocide), by worlds I mean the interlocking systems of conceptions we use to organize and explain our experiences (*Weltanschaung* and *Erschlossenheit* – not planets. Ontology not geology) and by breaking I mean introducing elements that defy enclosure within those systems (*Reductio ad absurdum* and *non-sequitur* – not bombs. Glitches not deletion). While these tactics of destructive augmentation have a long and noble history in the arts going back to Surrealism, Dada and beyond, recent advances in several technologies (and even more importantly, in the access and distribution of these technologies in the form of mobile devices) have made them especially effective and worth re-examining for those artists working in the medium of Augmented Reality.

What follows is an investigation of a collection of specific approaches drawn from the writings of the author William S. Burroughs about visual artist Keith Haring's graffiti inspired work and a discussion of the emerging technologies enable and extend them into use in today's world.

D.L. Baker (✉)
Department of Entertainment Technology, New York City College of Technology (CUNY), Brooklyn, NY, USA
e-mail: damonlbaker@gmail.com; http://damonlorenbaker.com

V. Geroimenko (ed.), *Augmented Reality Art: From an Emerging Technology to a Novel Creative Medium*, Springer Series on Cultural Computing,
DOI 10.1007/978-3-319-06203-7_18,

18.2 Origins and Influences

William Seward Burroughs II (February 5, 1914–August 2, 1997) was born in St. Louis, Missouri to a wealthy family (he was the namesake of his grandfather the founder of the Burroughs Corporation) and died in Lawrence, Kansas where he spent the last 15 years of his life with several pet cats. In between he became a drug addict, a novelist, an essayist, a painter, a spoken word performer, was elected to the American Academy and Institute of Arts and Letters, awarded the Ordre des Arts et des Lettres by France, graduated from Harvard, seduced boys in bath houses in Weimar era Vienna, enlisted in the army, murdered his wife, lived in exile in Tangier, Morocco, was a central member of the Beat Generation of writers along with Allen Ginsberg and Jack Kerouac, developed the Cut-Up technique of literary collage and juxtaposition with the painter Brion Gysin and used it to write several of the most influential novels in twentieth century American literature and was prosecuted for violating obscenity laws in multiple states over the blatant homosexual imagery of his work as part of an equally influential legal battle over his works (Morgan 1988). In 83 years of life he participated directly in multiple generations of artistic movements and influenced countless others in a wide range of media (Grauerholz et al. 2000).

Keith Haring (May 4, 1958–February 16, 1990) was born in a small town in Pennsylvania, moved to New York City as a teenager and lived there until he died in his early 30s from AIDS related complications (Gruen 1992). Despite his brief life he became an extremely influential and popular artist, drawing early inspiration from the explosive growth of graffiti in New York City of the 1970s and the pop art of Andy Warhol from the 1960s. His distinctive stylized and pullulating figures have become icons, not merely iconic but the actual (and often official) representation of social issues such as the AIDS epidemic (in 'Silence = Death' 1989), Gay Pride ('National Coming Out Day', 1988) and the crack epidemic ('Crack is Wack', 1986) that defined life in New York City during the 1980s and shaped Haring's life and work (Reading Public Museum 2006).

Haring was directly inspired by Burroughs' writing as well. Some examples from his personal journals discussing this influence include: "The major influence, although it is not the sole influence, has been the work of William S. Burroughs. His profound realizations, which I encountered in radio broadcasts of the Nova Convention, and in the book The Third Mind by Burroughs and Brion Gysin, which I have just begun to read, are beginning to tie up a lot of loose ends in my own work and thinking" (Haring 1996).

Also: "All of a sudden (now) some things became clear to me in a way that was similar to my introduction to the work of William Burroughs and Brion Gysin in 1978. I mean, that things that existed in my head as ideas I thought to be my own were given form by seeing their embodiment in the life and work of someone else. It is hard to believe I only discovered Burroughs, Ginsberg, etc. in 1978. I "accidentally" stumbled across the Nova Convention at the Entermedia Theatre in

Fig. 18.1 Keith Haring's "Tuttomondo" 1989 – Mural in Pisa Italy. http://commons.wikimedia.org/wiki/File:Tuttomondo_-_Haring_front.jpg

New York City and the effect was astounding to me. Like my "accidental" meeting with Andy Warhol and Pierre Alechinsky's work and New York City graffiti . . . " (Haring 1996).

The Nova Convention being "three days and nights of readings, panel discussions, film showings and various sorts of performances that sought to grapple with some of the implications of the writing of William S. Burroughs" that " . . . drew an interesting cross-section of people, and one suspected that only Mr. Burroughs could have brought them together. There were more or less conventional poets, novelists, performing artists, composers as diverse as John Cage and Philip Glass, rock musicians, serious students of American literature, street types and others" (Palmer 1978).

In 1988 William S. Burroughs was asked by the publisher George Mulder Fine Arts to write text to accompany a series of 10 silk screen images by his, by then, friend Keith Haring which juxtaposed borrowed images with Haring's graffiti inspired curving lines (see Fig. 18.1 for an example of Haring's visual style) titled "Apocalypse". (The copyrighted images are available online at the Keith Haring Foundation's website http://www.haring.com/!/keyword/apocalypse). Unlike their later 1989 collaboration "The Valley" which consisted of a story by Burroughs with illustrations by Haring (Burroughs and Haring 1989), "Apocalypse" contained an essay that was only thematically connected to the content of the specific images it was paired with. While it referenced New York City, graffiti, and some visual

elements of Haring's work, (Le Compte 1992) it drew upon imagery from much of Burroughs' earlier works and starred as the central figure not Haring but the Great God Pan. What follows is an attempt to unpack some of those sources to clarify the message of the essay and its connection to not just the practice of street art in the 1980s but to current work in Augmented Reality art as well.

18.3 The Birth of the Death of Pan

> Mariners sailing close to the shores of Tuscany heard a voice cry out from the hills, the trees and the sky: "The Great God Pan is dead!" Pan, God of Panic: the sudden awareness that everything is alive and significant. The date was December 25, 1 A.D. **But Pan lives on in the realm of the imagination, in writing and painting and music**. Look at Van Gogh's sunflowers, writhing with portentous life; listen to the Pipes of Pan in Joujouka. Now Pan is neutralized framed in museums, entombed in books, relegated to folklore (Burroughs and Haring 1988).

Juxtaposed narratives that become gradually more inter spliced are a common element in many of Burrough's works, so beginning an essay about New York City in the year 1988 with a story from Tuscany at the beginning of the first century and using it as a central symbol is recognizably Burroughsian. He even ties it in with his beloved Master Musicians of Joujouka so it is apparent that this essay is at least as much about Burroughs' work and aims as it is about Haring's pictures. And as is common with Burroughs' cut up based writing, this story wasn't written entirely by him, but spliced together from several sources.

The original textual source for the death of Pan is the first century Greek born Roman magistrate and essayist Plutarch. Tucked into a collection of 78 of his essays and speeches titled "Moralia" (loosely translated as "Customs and Mores") in between philosophical essays on the duty of siblings towards each other, and a comical dialogue between Odysseus and an enchanted pig is an essay titled "On the Decline of the Oracles", as the introduction to the Loeb English translation explains:

> Plutarch's answer to the question why many oracles in Greece have ceased to function is that the population is now much less than it was, and so there is less need for oracles now than in earlier times. For example, at Delphi there used to be two prophetic priestesses with a third held in reserve; now there is only one, and yet she is sufficient for every need.
>
> The statement of this simple fact hardly requires twenty-nine folio pages, but in this essay, as in the two preceding, there is much of the conversation of cultured persons which is not directly connected with the subject. Thus we find a discussion of whether the year is growing shorter, whether the number of the worlds is one or some number not more than five or is one hundred and eighty-three. We have further discussion of the number five, some astronomy, and a good deal of geometry, some interesting bits of information about Britain and the East and a rather long discussion of the daimones, the beings a little lower than the gods and considerably higher than mortals; perhaps the translation 'demi-gods' might best convey the idea in English. These beings are thought by many persons to be in charge of the oracles; certainly the god himself does not appear personally at his oracles; and in the case of the oracle at Delphi some account is given of the accidental discovery by a shepherd of the peculiar powers of the exhalation from the cleft in the rocks (Loeb Classical Library 1936).

To spare the reader from having to search through the rambling (yet thoroughly charming) essay (as Loeb accurately describes it: "Some parts of the essay make rather difficult reading, but it also contains passages of considerable interest and even beauty" (Loeb Classical Library 1936)). I have isolated the sections specifically describing the death of Pan and the decline of the oracles:

> "... it it is not the gods," said Heracleon, "who are in charge of the oracles, since the gods ought properly to be freed of earthly concerns; but that it is the demigods, ministers of the gods, who have them in charge, seems to me not a bad postulate; but to take, practically by the handful, from the verses of Empedocles sins, rash crimes, and heaven-sent wanderings, and to impose them upon the demigods, and to assume that their final fate is death, just as with men, I regard as rather too audacious and uncivilized."
>
> ... As for death among such beings, I have heard the words of a man who was not a fool nor an impostor.
>
> The father of Aemilianus the orator, to whom some of you have listened, was Epitherses, who lived in our town and was my teacher in grammar. He said that once upon a time in making a voyage to Italy he embarked on a ship carrying freight and many passengers. It was already evening when, near the Echinades Islands, the wind dropped, and the ship drifted near Paxi. Almost everybody was awake, and a good many had not finished their after-dinner wine. Suddenly from the island of Paxi was heard the voice of someone loudly calling Thamus, so that all were amazed. Thamus was an Egyptian pilot, not known by name even to many on board. Twice he was called and made no reply, but the third time he answered; and the caller, raising his voice, said, 'When you come opposite to Palodes, a announce that Great Pan is dead.' On hearing this, all, said Epitherses, were astounded and reasoned among themselves whether it were better to carry out the order or to refuse to meddle and let the matter go. Under the circumstances Thamus made up his mind that if there should be a breeze, he would sail past and keep quiet, but with no wind and a smooth sea about the place he would announce what he had heard.
>
> So, when he came opposite Palodes, and there was neither wind nor wave, Thamus from the stern, looking toward the land, said the words as he had heard them: 'Great Pan is dead.' Even before he had finished there was a great cry of lamentation, not of one person, but of many, mingled with exclamations of amazement. As many persons were on the vessel, the story was soon spread abroad in Rome, and Thamus was sent for by Tiberius Caesar. Tiberius became so convinced of the truth of the story that he caused an inquiry and investigation to be made about Pan; and the scholars, who were numerous at his court, conjectured that he was the son born of Hermes and Penelopê (Loeb Classical Library 1936).

This lays out the basic element of the story related by Burroughs in the opening of "Apocalypse" except for one crucial detail, the exact date. Further clues are provided by the Loeb editors:

> Students of English literature will be interested in the dramatic description of the announcement of the death of Pan; and students of religion will be interested in the essay as a very early effort to reconcile science and religion. That the essay had an appeal to theologians is clear from the generous quotations made from it by Eusebius and Theodoretus (Loeb Classical Library 1936).

The particular importance of this section to English literature will be examined later but working forward to the theologians who quoted from it so heavily we find one such quotation of this very passage in Eusebius of Caesarea's (a Roman historian, bishop and Christian polemicist born roughly 260 AD, died roughly 340 AD) "Preparation for the Gospel" which is a series of fifteen books which he

wrote to introduce Christianity to pagans and persuade them of his new religion's inherent superiority. As is common with this work he quotes large pieces of other's works to illustrate his view of historical information and then follow with his own comments. After relating the story of the death of Pan (mostly identical to the version in Plutarch so I will not repeat it here) he concludes with:

> So far Plutarch. But it is important to observe the time at which he says that the death of the daemon took place. For it was the time of Tiberius, in which our Saviour, making His sojourn among men, is recorded to have been ridding human life from daemons of every kind: so that there were some of them now kneeling before Him and beseeching Him not to deliver them over to the Tartarus that awaited them.
>
> You have therefore the date of the overthrow of the daemons, of which there was no record at any other time; just as you had the abolition of human sacrifice among the Gentiles as not having occurred until after the preaching of the doctrine of the Gospel had reached all mankind. Let then these refutations from recent history suffice (Oehler 1851–1854).

As previously mentioned this particular image of the death of the old gods, exemplified by Pan, fading out at the birth of Jesus was particularly important to many English authors and poets. A prominent example would be John Milton, who draws upon this image in his first major English poem "On the Morning of Christ's Nativity" (Lewalski 1966) written in 1629, beginning with a description of the birth of Jesus which includes a description of shepherds in their ignorance of the momentous event that has just occurred:

> The Shepherds on the Lawn, Or ere the point of dawn, Sate simply chatting in a rustic row; Full little thought they than That the mighty Pan Was kindly com to live with them below: Perhaps their loves, or els their sheep, Was all that did their silly thoughts so busie keep (Lewalski 1966).

And then proceeding in a description of the decline of the Oracles and the disappearance of all the old gods one by one, starting with a retelling of Plutarch via Eusebius spliced into the narrative:

> The Oracles are dumm, No voice or hideous humm Runs through the arched roof in words deceiving. Apollo from his shrine Can no more divine, With hollow shreik the steep of Delphos leaving. No nightly trance, or breathed spell, Inspire's the pale-ey'd Priest from the prophetic cell.
>
> The lonely mountains o're, And the resounding shore, A voice of weeping heard, and loud lament; From haunted spring and dale Edg'd with poplar pale, The parting Genius is with sighing sent, With flowre-inwov'n tresses torn The Nimphs in twilight shade of tangled thickets mourn.
>
> In consecrated Earth, And on the holy Hearth, The Lars, and Lemures moan with midnight plaint, In Urns, and Altars round, A drear, and dying sound Affrights the Flamins at their service quaint; And the chill Marble seems to sweat, While each peculiar power forgoes his wonted seat (Lewalski 1966).

This goes on for several more verses with an extensive list of pagan gods which are no longer worshiped and concludes with the triumph of the new order over the old with the birth of Christ:

> He feels from Juda's land The dredded Infants hand, The rayes of Bethlehem blind his dusky eyn; Nor all the gods beside, Longer dare abide, Nor Typhon huge ending in snaky twine: Our Babe, to shew his Godhead true, Can in his swadling bands controul the damned crew.

> So when the Sun in bed, Curtain'd with cloudy red, Pillows his chin upon an Orient wave. The flocking shadows pale Troop to th' infernall jail, Each fetter'd Ghost slips to his severall grave, And the yellow-skirted Fayes Fly after the Night-steeds, leaving their Moon-lov'd maze.
>
> But see the Virgin blest, Hath laid her Babe to rest. Time is our tedious Song should here have ending, Heav'ns youngest-teemed Star Hath fixt her polisht Car, Her sleeping Lord with Handmaid Lamp attending. And all about the Courtly Stable, Bright-harnest Angels sit in order serviceable (Lewalski 1966).

Burroughs takes the intentionally humorous overly literal step of asserting that this happened on Christmas Day AD 1, in a sort of homage to Eusebius' overly literal treatment of the story related in Plutarch. The primal age of savage mystery and wonder is replaced with an age of orderly science and reason as one world view is enclosed and subdued by a new one, drawing its imagery and metaphors from the stories of a passage of a Greek dominated world to a Roman dominated one. Each world building itself out of the pieces of the previous one most useful to it, and then carefully discarding the remaining bits lest they clog up the machinery of power and explanation. A new world has been created on the ruins of the old. A place for everything and everything in its place.

18.4 Off the Canvas, Out of the Galleries and into the Streets

Unsurprisingly queer artists whose work defied easy categorization such as Burroughs and Haring didn't feel that they fit into this neatly ordered world and were rooting for the opposition. After laying out the old stories, a new way out of this maze is presented:

> But art is spilling out of its frames into subway graffiti. Will it stop there? Consider an apocalyptic statement: 'Nothing is true. Everything is permitted.' – Hassan i Sabbah. Not to be interpreted as an invitation to all manner of restrained and destructive behavior; that would be a minor episode, which would run its course. Everything is permitted because nothing is true. It is all make-believe, illusion, dream . . . ART. When art leaves the frame and the written word leaves the page – not merely the physical frame and page, but the frames and pages of assigned categories – a basic disruption of reality itself occurs: the literal realization of art. This is a very different direction from Duchamp, Klein and Manzoni, of appropriating everything in sight by signing it or putting it on a pedestal. Instead of appropriating by framing and signing, remove the frames and the pedestals, yes, even the signatures. Every dedicated artist attempts the impossible, Success will write APOCALYPSE across the sky. The artist aims for a miracle. The painter wills his picture to move off the canvas with a separate life, movement outside of the picture, and one rent in the fabric is all it takes for pandemonium to sluice through (Burroughs and Haring 1988).

Burroughs correctly identifies the graffiti inspired street art that Haring and others are developing as an escape hatch from the controlled galleries and dead museums into the streets and beyond. Enabled by the relatively humble technology of the spray can artists were able to juxtapose their creations with the real world. A form of the cut-up techniques Burroughs and Gysin had perfected with words could now be practiced upon the world itself. It was a narrow crack but one that could spread

and grow. The beginning of an end. A revelation. An Apocalypse. “Neither the modern disruption of traditional structures of value, nor the postmodern disruption of modernist mythologizing; rather, it is the “literal realization of art”, a realization which simultaneously requires the destruction of art as a separate category, as a mirror to nature and life” (Murphy 1997).

18.5 Conclusion

All of this is intended as a collection of tactics and approaches to be used by contemporary artists working in the media of Augmented Reality seeking to maximize the impact of their work, particularly those using systems that function on commodity electronic devices such as smartphones. By a conservative estimate there are over one billion smartphones in use in the world today (Bicheno 2012). This puts a previously unthinkable amount of computational power, sensors and display systems into the hands and pockets of people from all walks of life all over the world. There are now widely available platforms for the creation of interactive art that escapes the boundaries of galleries and museums into the world in which real human beings live and breathe. Simply recreating electronic versions of past masterpieces or adding virtual bits and pieces on to the world like some sort of virtual decorator isn’t an effective use of the affordances of this new situation. By seizing upon the opportunity to cut up the real world with virtual worlds, with make believe, illusion, dream, ART we can break the bounds of our frames. Instead of pulling bits of the real world onto virtual pedestals and signing them we can aim, once again, for a miracle.

References

Bicheno S. Global smartphone installed base forecast by operating system for 88 countries: 2007 to 2017. London: Strategy Analytics; 2012.
Burroughs WS, Haring K. Apocalypse. New York: George Mulder Fine Arts; 1988.
Burroughs WS, Haring K. The valley. New York: George Mulder Fine Arts; 1989.
Grauerholz J, Silverberg I, Douglas A, editors. Word virus: the William S. Burroughs reader. New York: Grove Press; 2000.
Gruen J. Keith Harin: the authorized biography. New York: Fireside Press; 1992.
Haring K. Journals. London: Fourth Estate; 1996.
Le Compte R. A memorable collaboration. Lawrence Journal – World Newspaper. 1992 Aug 9.
Lewalski B. Milton’s brief epic: the genre, meaning and art of paradise regained. Providence: Brown University Press; 1966.
Morgan T. Literary outlaw: the life and times of William S. Burroughs. New York: Avon; 1988.
Murphy TS. Wising up the marks: the amodern William Burroughs. London: University of California Press; 1997.
Oehler QSF. Tertulliani opera omnia. 3 vols. Leipzig: T.O. Weigel; 1851–1854.
Palmer R. 3-Day Nova convention ends at the entermedia. The New York Times. 1978 Dec 4.
Plutarch. Moralia. Vol V. Loeb Classical Library Edition; London: William Heinemann Ltd; 1936.
Reading Public Museum. Keith Haring: journey of the radiant baby. Piermont: Bunker Hill Publishing; 2006.

Concluding Remarks: Today's Vision of an Art Form of the Future

Vladimir Geroimenko

"The future of Augmented Reality is bright." This would probably be the best sentence to start these concluding thoughts with. The problem is that so many books on so many topics have already used a similar sentence for their final chapters, but no one is now aware or cares about many of those topics any more. So, what about Augmented Reality? Is it going to stay with mankind forever or just for a while? As it was with many other information technologies, only time can provide a correct answer to this question.

What about today? To what extent can we be sure about a promising future for Augmented Reality and also a new form of art, based on this emerging technology? From the birth of mankind until the end of the twentieth century humans have lived in a single world (that we can now call the real reality). The invention of computers and the Internet has added a new realm of reality – a complex, exciting and useful digital world. Since then, we are living in the two different worlds (physical and digital), but not at the same time – at least, in terms our perception and attention. This is where Augmented Reality comes into play. This unique technology enables the very existence of a new world that is a mixture of the real and the digital. Augmented or Mixed Reality implants digital content into physical world in order to augment and enhance the latter. It makes it possible to experience digital world without leaving the physical one. Augmented Reality is a crucial step from a dualism of physical and digital worlds to their unity, and this makes that technology of paramount value to the future of humankind.

Augmented Reality Art is not only a novel creative medium, it is bound to become an organic part of the emerging hybrid world. It brings a new type of artworks into physical world – works that can be at any place, of any size and of

V. Geroimenko (✉)
School of Art and Media, Plymouth University, Plymouth, Devon, UK
e-mail: vgeroimenko@plymouth.ac.uk; vlad@geroimenko.com;
http://www.plymouth.ac.uk/staff/vgeroimenko; http://www.geroimenko.com

V. Geroimenko (ed.), *Augmented Reality Art: From an Emerging Technology to a Novel Creative Medium*, Springer Series on Cultural Computing,
DOI 10.1007/978-3-319-06203-7,

any structural and functional complexity. Any part of physical world can now be used as an artistic canvas, a computer screen or a gallery. Digital art augments the physical world in a creative way, and we have every reason to predict that this new art form will stay with us forever.

What is next? Next is an exciting creative practice in the new emerging world, and also intensive research into every facet of the newborn form of art. Hopefully this book will inspire new books, new conferences, new exhibitions and new groundbreaking artworks. This is why this pioneering book has been dedicated to the future generations of augmented reality artists.