Debate

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Invisible visualities: Augmented reality art and the contemporary media ecology

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Abstract
Augmented reality (AR) art is a form of artistic expression that complicates traditional notions of the visual arts. A visual AR artist trades in what we might call invisible visualities. In this essay, I consider the questions why does AR art matter as a cultural form of expression? and what does AR art contribute to contemporary technoliterary theoretical discourse? by putting several recent AR artworks into dialogue with some of today's most important literary-media theorists.

Keywords
Augmented reality art, contemporary visual art, literary theory, media ecology

Introduction

Augmented reality (AR) art is a form of artistic expression that complicates traditional notions of the visual arts. A visual AR artist trades in what we might call invisible visualities: There are no tangible paints or poster boards, and no AR artworks are nakedly visible. The works are born digital and they require a mediated unveiling.

By way of geolocation or programmed coding, the AR artist places visual and extravisual digital information into the sense-able sphere of the physical world, making it available to viewers via a mobile computing device like a smartphone. AR artists like Tamiko Thiel, Helen Papagiannis, Alan Sondheim, Re+Public, and those in the ManifestAR collective have displayed AR artworks in private galleries and in public squares. They have been invited to important contemporary art museums and biennales (e.g. ICA Boston, Venice Biennale, Istanbul Biennial) and have invaded, uninvited high-art galleries (We AR in MOMA) and public protest spaces (AROccupy).

It is important to note that the direct focus here is neither on the affordances of the 'unveiling' mobile technologies nor on the affects of ubiquitous computing on the body (politic). These topics,

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inherent in but not unique to AR art, are intimately entangled with digital art writ large and have been elegantly and extensively covered elsewhere. My focus here is on the distinct particularities of AR as a visual art. AR, as distinguished from virtual reality (VR), is a type of mixed reality (MR) experience: 'Whereas virtual reality involves cutting yourself off from the real world in order to immerse yourself in a computer generated virtual world, augmented reality involves overlaying a virtual world onto your view of the real world, so that you can experience both at the same time' (Gwilt, 2009: 594). With the advent of devices like Google Glass, AR and MR are becoming (natural?) rhythms within our 21st century media ecology. Ubiquitous computing wants to disappear the technological interface, while VR wants to disappear the body. AR art, on the contrary, wants to perform a reve(a)ling as part of its enactment. Neither the body nor the media disappear, but instead, they reappear as vectors for the expression and experience of art as both must be present in order to access AR art's invisible visualities. AR art – its immaterial manifestations and performative orchestrations – is our subject here; the affective body and mobile media are its subjects.

AR artworks like those discussed below are virtual installations designed digitally by AR artists, often in conjunction with computer programmers and/or interface architects, and then either geo-located to a precise location or coded into a scannable access point like a quick response code (QR code). When a viewer scans a smartphone or tablet camera over the artwork's designated coordinates, the smartphone screen reveals not only the physical scene as seen through its camera's lens but also the digital annotations the artist has inserted overlaying that scene.[1] The smartphone here acts as a mediating device that networks the immateriality of invisible art onto the spatial dimension of the immediate environment. With AR art, a digital installation e/merges into the physical experience of our bodies as we wander within its invisibly annotated milieu.

In order to respond to the questions why does AR art matter as a cultural form of expression? and what does AR art contribute to contemporary technoliterary theoretical discourse?, I will here put several recent AR artworks into dialogue with some of today's most important literary-media theorists.

Technoliterary media ecology

Following literary theorist N Katherine Hayles, we here situate our critical foundation on the level of media-specific analysis. This allows us, importantly, to see 'materiality [as] an emergent property ... a dynamic quality that emerges from the interplay between ... the physical artifact, its conceptual content, and the interpretive activities of readers and writers' (Hayles, 2004: 72). AR art makes manifest these emergent topographies as the works do not emerge into sensory existence until activated by the interplay of artifact, device, and viewer. If one of the networked parts in this relation fails, the art does not become active/ated. It is a radio signal deferred or unheard. The body and the device form an ecology acting as an interference force (see Lucking, 2013). The signal can easily be missed or misplaced without the body + device assemblage's intervening translation. The ecological interaction here brings virtual objects to life and it brings virtual life forms to the perception space of the body.

Bringing AR art to life; bringing life to the body

With AR art, devices act as multisensory interface organs to augment the body's skin and sensory receptors. In order to properly exist, AR art requires a viewer and requires that viewer to augment his/her biological visual apparatuses with extra-biological extensions. These devices and the senses they reveal then enter into – or, we might say, interplay with – today's dynamic, networked media ecology.

Technoliterary studies is recently taking up this issue, seeking frameworks for understanding how the invisible media composing our contemporary environmental ecologies are affecting our bodies and our phenomenal and ontological being. Mark Hansen (2014 forthcoming, 2006) and Richard Grusin (2010) are two who are investigating, among other things, the surveillance layers that mediate – or, via Grusin, premediate – our daily motions. Adding to this, scholars Jason Farman (2012), Jay Bolter and Diane (2003; Bolter and Richard, 1999), and the previously mentioned Hayles (2012, 2009), for instance, have developed various technoliterary theories, and universities like Massachusetts Institute of Technology, Concordia University, and Georgia Tech have founded transmedia labs to investigate our now-inescapable practice of living in an 'augmented' reality layered with networked and networking things.[2]

AR art instantiates a networked materiality that puts the body at the heart of its becoming. Despite its seeming dislocation from physicality, many AR art pieces have a location-based visuality that is only made manifest to viewers who physically inhabit the AR art's location. Though AR art may seem nonspatially ethereal, it is actually very particularly tied to a definite global positioning system (GPS) coordinate set or to a specific material object marker.[3] Though it seems to float in space, it is in many ways more physically placed than are our more physically tangible arts that are spatially unfixed. Unlike the easy mobility of a framed painting, geolocated AR art requires recoding in order to be relocated. Mobile AR art, though more movable than the geolocated sort, is nonetheless still physically located – it is digitally emplaced into or onto a portable image or object marker. Though AR art behaves as an intangible object, it still manages the traditional artistic act of taking place: it happens and it inhabits place. And it obliges the viewer's body to do the same.

The beauty of AR art, for us here, lies in its ability to aesthetically manifest many of these critical contemporary issues that cultural theorists are already bringing to light – or, better, bringing to life. As an exhibition and examination of cultural expression, AR art is an important form for our consideration.

AR art

As mentioned above, AR art spans the arc of public and private, of presentation and performance, and of interaction and subversion. In order to more properly illustrate its place within contemporary aesthetic expression, we will now look closer at a few examples, extracted from the growing body of AR artwork, that represent the span of the various formations AR art has thus far assumed.

Tamiko Thiel and Mark Skwarek

Digital visual artist Tamiko Thiel, considered a 'pioneer' in the field after creating one of the first navigable three-dimensional graphical virtual worlds, is currently producing AR artworks that address important global issues such as human rights and climate change.

Thiel's work *Jasmine Rain Birdcage* (2011) enacts our position that AR art exists in relation to the viewer's body. At the heart of this work is a multidimensional golden cage that, when viewed through a device, appears to trap the viewer by enclosing his or her body with its bars. The piece has been placed in Tiananmen Square in Beijing, in Mohamed Bouazizi Square in Tunis, and in Tahrir Square in Cairo. Thiel notes that viewing *Jasmine Rain Birdcage* is, in some of these places, actively prohibited and yet she maintains its position in order to comment on the governmental enclosures – encagements – of its citizens' rights.

Thiel's AR artwork *Reign of Gold* (2012), made in contribution to the AR *Occupy Wall Street* (OWS) exhibition, overlaid raining gold coins onto a long stretch of Wall Street, New York City, during the OWS demonstrations. AR artist Mark Skwarek, one of the organizers of this AR OWS project, contributed a rather more impactful AR piece that geolocated into this same New York City street stretch photos and videos of Occupy protesters active in other countries. This created a technoartistic show of global solidarity whereby OWS protestors from the United States could virtually protest alongside those from Egypt, England, and Berlin.

One of Thiel's newest works, a series called *Transformation*, speaks to global climate change by geolocating speculative images of a future sustainable urban environment onto the present cityscapes. In a Munich installation, for instance, when the viewer runs a smartphone device over a particular city square, sunflowers populate the sidewalks. In another, floating windmills are superimposed to exist alongside the city's cathedrals. And in yet another, power-generating water-mills are placed atop urban waterways.

Skwarek's *Flood* series performs a similar thematic gesture. In these works, Skwarek surrounds existing public and private spaces with images and animations of rising waters. When viewed, these public spaces – as seen clearly through the camera lens of the viewer's device – become inundated with the rising waters that will, presumably, overtake these spaces if climate change continues on its current projected path.

Thiel's and Skwarek's AR works are powerful visual manifestations commenting on the dynamic geopolitical and geological situations we find ourselves in today. Few other aesthetic media forms can bring to life issues such as these with as much visually present impact.

Helen Papagiannis

AR artist and researcher Helen Papagiannis provides an interesting point of contact with a more coded version of AR arts. Papagiannis adds touch to AR art. Differently from Thiel's and Skwarek's works above, Papagiannis's act more like QR codes by providing a deliberately tactile access point – such as a sculpture or printed book – as a physical layer to her AR pieces. The distinction is significant; by all accounts, touchable AR performs a unique aesthetic expression and initiates a different experience for the viewer.

In 2010, Papagiannis created an AR *Hanging Mobile* (ISMAR 2010) sculpture that hangs from the ceiling and functions as not only a touchable, seeable art piece but also an access marker to AR content. When one views the AR piece, a three-dimensional white butterfly appears on the screen, floating out from the sculpture.

Who's Afraid of Bugs? (2011) is an AR pop-up book that uses image recognition to access hidden dimensions. The book first appears as a typical children's book but when viewed through an iPad, it takes on new life: printed spiders begin to crawl and hidden bugs appear from behind printed flowers.[4]

Papagiannis envisions this AR book further developing by adding haptic parts and turning it into an agent of physical sensation. Using haptic/tactile interface technologies like those, for example, being created by the Magic Vision Lab in Adelaide, Australia, and by the Senseg group in Finland, Japan, and Taiwan, Papagiannis hopes to be able to integrate realistic touch-sensory experiences into her AR art. She suggests that with haptic feedback technology, a reader of *Who's Afraid of Bugs?* might actually be able to feel the furry back of the book's AR tarantula or feel the spider walking across his hand.

Augmenting the art archive

Museums and galleries are now regularly augmenting artworks and exhibits. Many museums have adopted the use of scannable QR codes, allowing a museum viewer to access extra information about an artwork or exhibition, so far largely text based, via a smartphone device.

A new platform called Aurasma produces a rather more fancy augmentation by permitting users to create original born-digital AR art in interaction with existing artworks by superimposing original images, video, and dynamic animation onto physical artworks already hanging in gallery spaces. When programmed to do so, Aurasma recognizes the contours of an augmented artwork – self-adjusting along with the artwork if the camera device or the artwork moves – and the viewer sees then the newly created artistic content flowing exactly atop the original gallery image.

The Museum of London and the City of Philadelphia Department of Records are two museums that have gone a step further, creating urban AR exhibits by geolocating archival photos onto the corresponding city coordinates depicted in the photographs' scenes. They create a situation whereby a viewer experiences a city augmented not so much by multiple overlaid images but by simultaneous temporalities of a single image. The present day scene is seen clearly through the device's camera lens, and the archival photo of that exact location as it existed in the past is overlaid atop the scene on the device's screen.

Why does this historical treatment of AR matter to contemporary cultural-literary discourse? The photos here, in this sort of AR archival artwork, are of interest to us today because they perform a discursive gesture that comments on – and reproduces – the critical conversations theorists have long had, and continue to have, about the precarity of the archive. They are an important manifestation of the theoretical. As technologies expand our physical sensorium and our perceptual capabilities, we return to these questions anew. We are now faced with the problem of archiving immateriality (e.g. born-digital artwork) and with the challenge of curating archival content immaterially. The archive is now literally, here in these exhibits, as it was hypothetically in the literary theory of the past. As defined in the work of literary-cultural philosopher Foucault, the archive is not an artifact but a system – a system of formulation and transformation (Foucault, 1969: Part III). As superimposed annotations merged onto the contemporary landscape, these archival images form a system intertwining simultaneously many temporalities. This is not unlike how some understand our current condition within today's hyperspeed technological media ecology.[5] The museums' use of an AR art exhibit as an archiving technology is also a rather fluid demonstration of the issues of deep time and the porosity of temporal parameters that are of interest to those today researching not only media ecologies but other important contemporary issues (see Gould, 2013).

Dancing (with) the AR

A final AR art form to mention here is AR performance art. In a 2012 Eyebeam collaboration between choreographer Alan Sondheim, dancer Foofwa, AR artist Skwarek, and live musicians, Foofwa dances with an AR avatar partner who is visible only through a viewing device's screen. Without the device, a viewer sees only Foofwa. With the device, Foofwa's dance becomes a duet.

Another example is the performance DansAR 01, performed at Skånes Dansteater in Malmö in 2013. In this piece, an empty dance studio fills with dancers when a viewer scans her device's camera over the space in the studio, where a previously videoed dance performance has been geolocated. The studio is not only inhabited by AR dancers but is also open for others to traverse. When a man walks through the augmented studio space, he unknowingly interacts with the AR

dancers – invisible to him – visible on the viewer's screen. A person holding a viewing device sees both the real man walking through the space and the AR dancers, and a strange choreography is produced between them. In one video documenting the event, a woman holds an iPad, seeing both her partner, who is physically present, and the digital dancers on her screen, and she directs her partner to move in certain ways to accompany them. This type of AR performance art allows participants to become performers themselves, thus adding another node to the interplay AR creates between artifact, device, and viewer.

A new (art)form of seeing?

Media theorist Mark Hansen (2013), mentioned above, begins his recent essay, ''Ecological Pharmacology of 21st Century Media'', by quoting artist Jordan Crandall, 'Through a technologically enhanced perception, a mathematical seeing, patterns come into view that previously could not be seen by the naked eye, in ways that augment, or occlude, traditional observational expertise, and human intuition.' Though Hansen and Crandall, by citation, are talking about the invisible data-capture/surveillance devices that are now ubiquitously ambient, the same sort of media ecological situation they describe applies to AR art. Hansen convincingly argues that the parameters of presencing and sensory perception are transformed when 21st century technologies capture data unavailable to – and disconnected from – the unmediated body and feed that forward back into the sensorium of the present body. For Hansen, these technologies and the mediated ecology they produce alter the 'domain of sensibility' of the experiencing body in such a way that the body then enacts itself differently. We might say the same of AR art.[6]

AR art complicates modern modes of sensibility and conceptions of aesthetic perception. AR art coexists, invisibly, with the physical space of the body even if we are not directly experiencing its sensorial presence. The man discussed previously, who is directed by his partner to perform in concert with the AR dancers in the Skånes Dansteater studio, is not seeing, but is, in a sense, sensing the invisible actors. This is a new (art)form of seeing.

Returning to Foucault and turning too to the classic critical work of theorist Walter Benjamin, we can situate aesthetic perceiving as something that has always been contextually contemporary. For both Foucault and Benjamin, aesthetic perception is bound to the technological and social conditions of its context. If this is so, AR art is today instigating a new form of aesthetic seeing, a new domain of sensibility, that is characterized by complex invisible visualities. AR art matters; it exhibits and is an exhibition of contemporary (techno) cultural expression.

Notes

1. There are, of course, new and emerging interfaces for AR art interaction. Glasses, wearables, and any number of other dynamic surfaces will perhaps soon overtake the 'cumbersome' smartphones and tablets we currently use to access AR artworks. Also on the near horizon are tactile touch screens that may further alter the ways we experience our (in)visible arts.
2. These are just a few examples from a long list of impressive studies on these topics. For academic lab spaces see, for instance, *Massachusetts Institute of Technology's Fluid Interfaces* group as well as Sha Xin Wei's *Topological Media Lab* at Concordia University in Montréal, *The HIT Lab NZ* at the University of Canterbury, and the *Augmented Environments Lab* at Georgia Tech.
3. This essay includes examples of both Thiel's work is primarily geolocated while Papagiannis's AR book is an example of more mobile AR art. Though not included in the text here, Julian Oliver's *levelhead* is another great example of mobile AR art tied to relocatable physical objects.

4. The book was in fact partly conceived as an AR treatment to help those struggling with arachnophobia. One of the pages allows a reader to insert his own hand into the image by holding the iPad above the book and placing his hand in the sight line of the camera. What then appears is an AR tarantula. The effect is that a user sees the environment of the tarantula (the actual book page), his hand within that environment (through the iPad camera), and the AR tarantula walking atop both. The hope is that if a patient can see his own hand interacting with a life-like virtual spider, perhaps he can be desensitized to his fear. VR Therapy (VRT) has been used since the 1990s to treat phobias, pains, posttraumatic stress disorder, and certain social anxiety problems.
5. See for instance Berardi (2011) and Zielinski (2006), as well as many of those previously mentioned in the text and notes here, for various treatments of cyber time, deep time, and digital temporalities.
6. See Wamberg (2013: 470): 'In augmented reality, the surroundings may react to your own bodily behavior long before you are conscious of it – as is artistically explored in the Canadian *whisper[s]* project (2003–2005), in which everyware infiltrated diverse pieces of underwear, making, for instance, a vibrator move in one agent's shirt in response to another agent's breathing.'

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