Seeing is Sensing: Three Strategies for Multisensory Experience in Mixed Reality Art

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Abstract

In this paper we outline three strategies used by Mixed Reality (MR) artists to produce experiences that challenge vision as a single sense modality. The interactions enabled in the works that we discuss emphasize how virtual technologies produce embodied experiences and a mixed sense of reality, thereby re-conceptualizing both MR and virtual technologies as multi-sensorial embodied practices. Exploring three different installations, we show how this mode of multi-sensory experience is also a multi-media phenomenon. Seeking to reconsider both the 'self-world' and the 'self-other' relationships, these installations further demonstrate how such induced embodied experiences can be utilized to initiate what we understand as a sense of critical empathy. In seeking to both virtually and physically place the viewer in an/other body, an/other space, or in granting them access to an/other history or cultural knowledge, these works fundamentally aim to shift viewers' perspectives of their environment, while at the same time exposing the constraints of their own embodied position.

Keywords

Mixed-Reality, Virtual Reality, Critical Empathy, Locative Media, Multisensory Experience, Interactivity, Embodiment

Introduction

The articulations of Mixed Reality (MR) that we examine in this paper challenge vision as a single sense modality through which consciousness and perception are generated. Within the works that we discuss, the mechanics of vision that are housed in the body function as a trigger to activate and renew the sensorial input coming from the encounters of self and environment. Rather than simply seeking to counter the 'hegemony' of vision within modernity and Western systems of knowledge, these works offer a complex model of perception and subjectivity based on mixed, multi-layered modalities and embodiment.[1]

Mark Hansen has declared that, ultimately, all reality is a mix formed through interfacing bodies with their surroundings and technologies. [1] Today, Hansen explains, many forms of virtual interactions are created in order to expose—rather than to conceal—the state of mixed reality. The interactions enabled in these works emphasize how virtual technologies produce embodied experiences and a mixed sense of reality, thereby re-conceptualizing both MR and virtual technologies as multi-sensorial, embodied practices. Hansen's perspective on reality and perception, as demonstrated through the works that we discuss, is characteristic of the second wave of virtual reality theory: virtual realms are no longer perceived as dismissing the body, but rather allow for new sensory options that extend human sensorial embodiment and experiences of space and time. While these expansions are often triggered by visual input, they are nonetheless enhanced and reinforced by an overall sensory input. Therefore, although many digital art objects are indeed meant to be experienced primarily through vision, our eyes' input in the case of many mixed-reality projects is intended to initiate a broad sensory response. Hansen's discussion of perception recalls Victor Burgin's argument that all space is an enmeshment of internal psychic reality with the external environment. [2] A similar approach is also adopted by Ron Burnett, who argues that the individual perception of reality is established in an ongoing process of "hybridization", in which self and image imbue one another with meanings. [3] In relation to MR theorists, Hansen is most notably in line with media-art scholars such as Oliver Grau and Frank Popper, who similarly argue that although some VR environments might still attempt to disembody the viewer, such environments can also reaffirm viewers' corporeality. [4]

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[1] Here we draw on Jonathan Crary's discussion of the study of "visuality" as being at risk of ignoring "historically determined notions of "embodiment," in which an embodied and perceiving subject is both "the location of operations of power and the potential for resistance. See: Jonathan Crary, *Suspensions of perception: attention, spectacle, and modern culture*. Cambridge, Mass: MIT Press, 1999: 3. A similar perspective is also foregrounded by David Parisi in *Archaeologies of Touch: Interfacing with Haptics from Electricity to Computing,* University of Minnesota Press, 2018.

This paper therefore analyzes three installations that demonstrate three strategies for the employment of vision as a means for enhanced proprioception and space-sensing. Examining works that employ three different forms of MR (HMD VR, audio AR, and an audio-visual AR mobile app), we demonstrate how this mode of multi-sensory experience is also a multi-media phenomenon. Dating from 1996 to 2017, these installations indicate a historical continuity in that these strategies for multisensorial experiences can be traced to the early stages of MR. Within their varied contexts, all these installations also address significant political themes related to the body, difference, and occupation. Seeking to reconsider both the 'self-world' and the 'self-other' relationships, these installations further demonstrate how induced embodied experiences can be utilized to initiate what we understand as a sense of critical empathy.[2] In this context, therefore, critical empathy is not solely about identifying with the position of another, but rather about understanding one's own situatedness and positionality as historically and socially constructed. It is with this notion of critical empathy as understanding oneself in relation to others that we analyze how these works seek to enable a relational inhabiting of bodies and spaces to foster an understanding of the positionality of others. Ultimately, we demonstrate how, while allowing the user to get closer to an 'other', these embodied engagements also inevitably emphasize that we are subjected to our own bodies.

While the three strategies discussed are not an exhaustive account of the modes of multi-sensoriality in MR, they could point towards a larger framework whereby MR employs multisensorial experiences to create an awareness of the social structuring of space that fosters critical empathy with the bodies, spaces, and histories of others.

Seeing in an/other body

Systems, a series of software works developed by the artist Mathieu Briand between 1996–2006, presents a complex articulation of issues related to the hierarchy of the senses, the diffusive boundaries of media, and the theorization of mixed reality as an empathy tool. Within the work each participant is equipped with an individual Head Mounted Display (HMD) device, creating the expectation of a conventional VR experience. (Figure 1.) However, in *Systems*, participants experience the view of another user who is wearing another *Systems'* HMD at the same time and in the same space. [5] The user's navigation of the viewing environment is therefore performed through this machine interface that displays the visual feed of another.

Figure 1. Mathieu Briand, *Systems*, VR installation presented at Egofugal, 7th Istanbul Biennale, Istanbul, 2001. ©Mathieu Briand.

The defamiliarization of the mechanism is almost instantaneous; while the familiar interaction with the apparatus produces unexpected results, participants are required to contemplate the ways in which they themselves interact with those devices, and to question the impact and agency that virtual environments have on them, as well as on their sense of reality. The viewer's experience of their augmented vision simultaneously heightens an awareness of the location of the self and the sensing of the other. This environment therefore enables the user to experience the viewpoint of another, and even the potential to see themselves from this point of view; the work produces the potential for the user to not only see themselves seeing but to see themselves *sensing* space, both as themselves and as 'an other', producing a convergent sense of embodiment generated through machine interaction.[3] What this engagement establishes is a simultaneously embodied and transcendental experience.

The work also engages conceptually with difficulties of visual adjustment and temporal alignment, therefore further challenging the privileged position of vision in perception. Viewers of the work must adjust to both to the vision of another and the temporal delays experienced through the process of live feed transfer in early wearable

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[2] For more on identification and performativity in location-based and mixed-reality media see: Joshua Meyrowitz, *No sense of place: The impact of electronic media on social behavior*, (Oxford University Press, 1986); Rob Cover ed. *Digital Identities,* (Boston: Academic Press, 2015); Steve Benford and Gabriella Giannachi, *Performing Mixed Reality,* (The MIT Press, 2011).

[3] This application of VR technology is in line with Don Ihde's concept of "post-phenomenology": a contemporary contextualized form of phenomenology that takes into consideration the significance of available technologies and their current practice in the interpretations and engagements of bodies in the world. See: Don Ihde, *Postphenomenology and Technoscience* (SUNY Press, 2009), 23.

technology. The viewpoint of the other does not arrive on the viewer's headset screen instantaneously, and so they also experience a temporal rupture and see another's view of the immediate past. A heightened complexity occurs when multiple users may be engaged in this interaction, and participants can switch between various viewpoints. Although the technological mechanisms of the work did not always allow for the intended experience, the concepts which the work develops have greater implications. In an environment such as that created in *Systems*, viewers depend upon their interaction with another participant who is similarly mediated by the machine to locate themselves. (Figure 2.) In this work, the machine is both active and observing: as a receiver and emitter of embodied vision it both enables and limits the body through the tracking systems that are a necessary component of this immersive environment. Wearing the VR headset extends our vision and movement while putting them under surveillance. The wall-wired visor becomes almost metaphorical in this case, as the machine is employed here to make us reconsider our embodied experience as a seeing-self: it shows us great potential while demonstrating the impossibilities inevitably incorporated within it.

Systems may be read as a literal application of Hansen's mixed reality perspective: Briand's work shows us how our embodied experience, and accordingly our perception of reality, is activated and mixed with everyday virtual technologies. As *Systems* estranges our self-technology relationship, we regain awareness of the ways that we interact with MR primarily through being a body. Briand's work also shows us how we automatically go beyond our bodies to adjust our sight with that of the machine in order to produce a mixed reality. The work produces a system for interaction within which a viewer may quickly question the benefit of visually locating an image of the self on the screen in comparison to using the body itself to sense space, and in each case the experience is controlled by both another user and a machine that mediates between the two bodies. In *Systems*, our sight is neutralized and expanded at the same time, thus making us re-adjust our bodies interpretation of space, as an inevitable dissonance arises between our vision and the rest of our sensory input. Accordingly, *Systems* makes us think of both the opportunities and the politics of being able to see through someone else's eyes. In this way the work might be situated in relation to the extensive and ongoing debate regarding VR and empathy. While many VR works offering alternative viewpoints have been created with the goal of producing heightened empathy and identification, the actual ability of VR to achieve this desired e/affect rather than to produce a spectacle of highly complex human situations not only remains contested, but also articulates an ongoing controversy about the actual competence of VR

devices. [6, 7] This debate has a longer standing historical precedence, and a similar concern was raised by Susan Sontag in relation to photographic reportage in the early 2000s. [8]

Figure 2. Mathieu Briand, *Systems,* VR installation presented at Egofugal, 7th Istanbul Biennale, Istanbul, 2001. ©Mathieu Briand.

Lastly, *Systems* could also spark the realization that virtual environments are neither a form of separate reality nor do they simply exist as representations of material reality. Instead, they form an integral part of the living continuum of the spectator, as they are generated through and by specific bodily engagements. [9] In light of this, *Systems'* disruption of familiar visual processes to produce a heightened awareness of the sensing body may also be read in relation to Foucault's assertion in the "Utopian Body" that the body is the ultimate focal point: it is around the body "that things are arranged. It is in relation to it – and in relation to it as if in relation to a sovereign – that there is a below, an above, a right, a left, a forward and a backward, a near and a far. The body is the zero point of the world", and it is "where paths and spaces come to meet […] and it is from it that all possible places, real or utopian, emerge and radiate". [10] As virtual technologies have become mobile and inscribed onto the body, the digital and physical realms can be conceptualized as a unified, convergent experience, emerging through our perpetual, embodied interaction with MR technologies. In *Systems* and other MR works, the user's body becomes the focal point in which virtual and non-virtual realms converge into one. While Systems establishes one's body as a site of sensual collision in which the sensing of multiple bodies' converge, this interaction also raises questions regarding the alleged transparency of the apparatus and its agency. While the body is indeed a focal point, this focal point can only be created by means of electronic control.

Seeing into an/other space

Another example of how our vision is employed to produce an overall experience of alternative, expanded, machine-based sensing is mobile Mixed Reality (MR). In these interactions, the MR interface initiates spatial navigation and proprioception that, like *Systems*, can be used to produce a sense of critical empathy. Within this strategy, multisensorial experiences may be seen to play on the idea of spatial separation as a means to reflect on participants' own situatedness.

Figure 3. Mushon Zer-Aviv and Laila El-Haddad, *You Are Not Here: Gaza/Tel-Aviv,* 2007. ©Mushon Zer-Aviv and Laila El-Haddad.

This becomes particularly apparent and effective when the convergence of the virtual and non-virtual domains is utilized to produce an alternative, or a heterotopic real space.[4] Mixed reality environments can juxtapose two remote places to create a new mode of proprioception through navigation. This form of heterotopia can clearly be seen in the MR tour *You Are Not Here: Gaza/Tel-Aviv* (2007), created by the Israeli media-scholar Mushon Zer-Aviv and the Palestinian journalist Laila El-Haddad. (Figure 3.) Although this is an early example of MR, in its use of geo-located information it still employs MR concepts to provide us with a spatially inclusive experience.

Figure 4. Mushon Zer-Aviv and Laila El-Haddad, *You Are Not Here: Gaza/Tel-Aviv,* 2007. ©Mushon Zer-Aviv and Laila El-Haddad.

The project consists of recorded audio, and a double-sided physical paper map; as one side of the map presents the city of Tel-Aviv, the other side displays a map of Gaza. Users then employ this double-sided map to find markers located throughout Tel-Aviv. These markers are points of interest indicated by stickers with phone numbers that can be identified by the tour's participants in-situ. Upon arrival at one of these markers participants dial the given phone number whereby a system identifies their (Tel-Aviv) location and plays a corresponding audio track that describes a parallel Gaza location's views and sites. When looking at the map against the sunlight, walkers can also 'see' where they are in the Gaza map (Figure 4.) This project therefore operates as an augmented walking tour, allowing participants to encounter "views" of Gaza while walking the city of Tel-Aviv. While the Gaza strip is only 75 km away from Tel-Aviv, it is an enclosed territory. This is one of the reasons why, other than promoting an Israeli-Palestinian dialogue, *You Are Not Here* gains social significance: participants in Tel-Aviv are called upon to envision and navigate Gaza, while in fact, it is inaccessible to them. Seeking to establish a new spatial performativity, this project conceptually shrinks space in order to multiply its meanings through exposing spatial relationality. *You Are Not Here* makes participants walk through, and produces an encounter with two cities simultaneously.

Thus, *You Are Not Here* asks participants to question and contemplate their own situatedness. [11] As the map blurs against the sunlight and the audio alienates participants' sight, Zer-Aviv and El-Haddad's project asks walkers to re-think their current geographical position and socio-historical context by means of othering it, while simultaneously reaffirming and reminding them of their

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being in a specific physical place. In other words, we are asked to imagine what it is like to be in another place while firmly recognizing that we are not there. Visual means here function as a gateway, since they enable another way of seeing and navigating - and therefore of sensing - space. The city of Tel-Aviv is now seen in relation to Gaza, and a conception of actual space is re-shaped based on this comparison. Material space is thus visualized as itself and as an Other at the same time; it gains both a symbolic meaning, and manifests Foucault's concept of Heterotopia as a conjunction of Other spaces.

Similar to Foucault's argument, Zer-Aviv and El-Haddad's sight-seeing tour is not historical or chronological, but rather it is heterotopic: instead of learning about the history of Tel-Aviv, we are called to understand Tel-Aviv's most famous sites in relation to specific Gaza locations. [12, 13] The Gaza strip thus comes to be explicitly incorporated within the spatial narrative and locational identity of Tel-Aviv and this effect has a dual outcome: on the one hand it aims to produce an increasing spatial estrangement of Tel-Aviv and thus raise our locational awareness while, on the other hand, it paradoxically intertwines the histories and stories of the two cities. Nonetheless, although the forming and history of the two locations are inevitably tied, such ties are rarely shown or emphasized in the urban space of Tel-Aviv. In a way, such renewed seeing and sensing results in the morphing of material space in light of mobile information technologies' output. This resonates with Deleuze and Guttari's concepts of deterritorialization and reterritorialization, which reflect on the processes of decoding and re/encoding socio-spatial norms in a complex, relational system. [14] In this case, however, the act of reterritorialization enables our sense of critical empathy, as this act of spatial reoccupation is a direct result of our this new mode of seeing and embodied movement through space.

Using location-based MR, the work constantly maps and re-maps our surroundings, and it is through this act of mapping that we gain and interpret both our sense of place and our sense of being. This form of mapping is theorized by Karen O'rouke as "performative cartography", and according to her, such processes of active mapping that emerged with mobile technologies are designed "to locate ourselves in the world, allowing us to make sense of our situation and to act on it." [15] O'rouke further argues that locative media, such as AR, are capable not only of annotating the world but also of indicating and tracing other subjects in our surroundings. [16] This point is explicitly visualized in *You Are Not Here*, which illustrates both proximities and distances between spaces and identities. A related argument is articulated by Jason Farman, who describes how mapping through mobile technologies contributes to our sense of proprioception: mobile technologies, Farman argues, call for a relational understanding of space through the act of the cognitive and social mapping of it. [17] This point is emphasized with the practice of MR compositional convergence in *You Are Not Here*: as our bodies navigate space, we simultaneously launch and discover virtual and non-virtual information that actively participates in the act of mapping and interpreting space and in forming our relations to it. Alongside its specific social and political implications, *You Are Not Here* also accentuates AR's unique ability to reconfigure space as a composition of places, narratives, events, and identities in order to confront us with our constructed perception of immediate environments. [18] Indeed, as Farman asserts, "how we represent space has everything to do with how we embody that space". [19]

Seeing an/other history

While MR enables a multi-sensorial experience of immediate environments in relation to an/other spaces, such multisensorial experiences can also be employed to defamiliarize spaces in light of their conflicted histories. By means of intervening digital outputs with existing codes of material spaces and navigation practices, MR is able to re-territorialize and manage the socio-spatial relations in various forms in order to produce new modes of control or – on the contrary – to reject existing spatial authority and raise empathy. The implications of this are evident in contemporary works such as *Wikiup*.
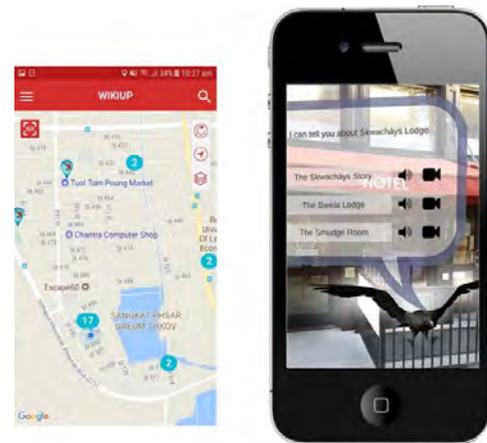

Figure 5. *Wikiup*, produced by Adrian Duke, AR Application screenshots, 2017. ©Vancouver Native Housing Society.

Physical and virtual elements converge in the MR application *Wikiup,* produced by Adrian Duke and the Vancouver Native Housing Society. (Figure 5.) Initially launched in 2017 at the Kanata Festival in Vancouver

during Canada 150 Celebrations, this application enables users to locate augmented avatars across significant First Nations sites in the wider Vancouver area. The avatar and its accompanying information on the location of the user can be accessed on site by an application that geolocates the viewer through GPS. Once activated, these virtual storytellers enable a user to access a range of audio-visual information about the land that they occupy. There is certainly precedence for using audio tours to provide users with interactive indigenous narratives of place, such as in Quelemia Sparrow's site-specific podplay, *Ashes on the Water.* [20] Still in development, the information provided in *Wikiup* about select locations is being largely collected from verified 'storycatchers', cultural guides, and elders, who narrate the stories located along walking routes in the application. Stories collected include a history from the Squamish Nation of the famous Vancouver mountain peaks *The Twin Sisters*, which were renamed at the end of the nineteenth century by Judge John Hamilton Gray to *The Lions*. The avatars that are activated by a user reveal the indigenous histories of a specific physical place through video and audio, and more fundamentally enable the possibility for a broader, renewed reterritorialization of space. Asserting an indigenous presence in cyberspace remains fundamental and is the goal of other digital works by artists such as Jason Edward Lewis and Skawennati, co-founders of AbTec. [21] Through its production of a sight-based embodied experience, *Wikiup* uses the potentials of MR to expand and extend an indigenous occupation of this territory through the virtual realm of cyberspace; it enables the convergence of a virtual indigenous presence within the physical landscape and in the space of the user. The application's potential lies in revealing the layers of a landscape from an indigenous perspective, and this has vast implications for asserting indigenous presence and sovereignty in Turtle Island. Although this application continues to undergo development, it is exemplary of MR practices that reveal the sociopolitical layers of land through the convergence of the virtual and physical. Through the production of an embodied and performative viewing experience these works ask users to consider the relationship between movement/navigation, storytelling, memory, and place. They therefore ask users to critically engage with their location, and to (re)locate themselves in a settler colonial landscape.

While many scholars acknowledge that different ways of mapping can reconfigure our relationships with our surroundings, these MR works use mapping and spatial navigation in order to initiate a perceptual paradigm of convergence that a viewer must navigate in situ. By geo-locating virtual content and aligning it with physical locations, the viewer has access to the narratives that have shaped space; *Wikiup* therefore offers an enhanced, more holistic sense of space and place. The users' immediate environment becomes inscribed with multiple perspectives, which are all site-specific. By relating to participant's immediate location, *Wikiup* contributes to and extends the situatedness of users: it not only reaffirms their physical location and acknowledges their bodily existence in a certain spot, but exposes their otherwise implicit and consequential placement in a larger setting of socio-cultural and historio-political events.

Through this MR strategy, space may point to an entire network of political, historical, economical, and other shaping forces. Space thus becomes much more than a physical location; rather, it is a site of convergence of virtual and actual elements, and a convergence of past and present. MR therefore obliges us to also recognize the relationality between the virtual and the physical. This convergence coupled with the multisensorial seeing that is enabled by MR produces relational interactions that are capable of shifting perceptions of space. Within works such as *Wikiup,* virtual elements are contextualized via their relation with the actual domain, and actual elements are re-contextualized via their relation with the virtual elements that are associated with them in real-time. As a result of this ongoing process, the MR space exists via a dialogue of deterritorialization and reterritorialization of elements in relation to one another, through the continuous experience of engaging bodies.

Conclusion

Naturally, our notion of critical empathy can be easily applicable to the analysis of other MR projects. Earlier examples to which this concept is particularly relevant include John Craig Freeman's *Border Memorial* (2012) and Heidi Rae Cooley's *Ghosts of the Horseshoe* (2012), alongside more recent installations such as Nancy Baker Cahill's *Battlegrounds* (2019) and projects by the collective 'Movers and Shakers NYC' (2019). [22]

That the virtual domain in the works examined may not be read as discrete from the lived experience of the spectator is also fundamental to these practices. As these strategies are practiced across different media, they provide an additional meaning to the term Cross-Reality (XR): in seeking to both virtually and physically place the viewer in an/other body, an/other space, or in granting them access to an/other history or cultural knowledge, these works fundamentally aim to shift viewers' perspective of their environment, while at the same time exposing the constraints of their own embodied position. While we may question whether these aims are achieved within the specific works explored, what these strategies reveal is the potential for MR to create embodied experiences that challenge existing, more traditional notions of seeing and sensing spaces. These works also raise broader questions

regarding the ability to ever fully identify with or occupy the vision, body, space, or history of an/other, and the subsequent limitations of empathy. These strategies therefore raise more fundamental ethical questions for MR practices at large: what are the possibilities and subsequent implications of this practice, and of potentially inhabiting the body, vision, and memory of an/other?

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[3] Ron Burnett, *How Images Think* (Cambridge: MIT Press, 2004), 52, 114.

[4] Oliver Grau, *Virtual Art: From Illusion to Immersion*, trans. Gloria Custance(Cambridge, Mass.: MIT Press, 2003); Frank Popper, *From Technological to Virtual Art* (MIT Press, 2007).

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[16] O'Rourke, *Walking and Mapping*, xviii and 132.

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[19] Farman, *Mobile Interface Theory,* 35.

[20] The work functions as a recorded piece of site-specific "theatre" that audiences download and listen to in situ: *https://ravenspiritdance.com/project/ashes-on-the-water/*

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