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Augmented Reality

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Augmented reality (AR) is a term used for media technologies that add symbolic or semantic elements, usually visual and digital, to the perceptual material environment, or live media content depicting this environment. It is an example of mixed reality—in other words, a compound experience consisting of the immediately perceived and a digital layer of mediated content. If virtual reality (VR) disengages the viewer/reader from the nondigital or nonmediated sensory, physical environment through an act of replacement, AR works add virtual/digital inputs to that environment. Typically, AR experiences require headsets (AR glasses or head-mounted displays) or portable screens (tablets and smartphones) that act as interfaces for the compound experience.

The verb “augment” originates from the Latin *augmentāre*, to increase, and thus suggests an addition, or a supplement, to the physical environment experienced without the introduction of artificially created content. There is a long history of immersive visual media technology even prior to the emergence of digital media, as audiences in the nineteenth century were lured to pay for access to early panorama displays, seduced by the promise of having their familiar physical environment replaced by a spatially or temporally distant vista. This kind of experience would be an early version of VR, an entirely immersive experience. But augmentation, too, has a history that precedes the emergence of digital technology. Lev Manovich considers augmentation less a technology than “a cultural and aesthetic practice,” which covers various kinds of architectural and built environments, cinema and art, and, for example, urban spaces where electronic screens cover buildings and walls (Manovich 2006: 1–2). Some video art works

in the 1970s, or what Geoffrey Alan Rhodes has termed “proto-AR,” used projected live feed from a camera as a part of installations in gallery spaces (Rhodes 2014: 130). Twentieth-century cinematographers employed AR-style methods prior to the widespread adoption of contemporary digital interfaces by adding texts, images, or animation to otherwise realistic visual narrative aesthetic, like in the 1988 film *Who Framed Roger Rabbit*. In short, unlike immersive art works relying on pre-digital or digital media, AR works do not seek to replace the perceived environment with a virtual one, but alter it by integrating visual (or audible, or even tactile), symbolic material into it—an immersive suspension of disbelief is not possible, even if viewers remain unaware of the encoded processes contributing to the experience.

The first head-mounted device for an AR experience was created as early as the late 1960s by Ivan Sutherland at Harvard University (even though the headset was so heavy it had to be hung from the ceiling), but the term “augmented reality” itself was not coined until the 1990s by Professor Tom Caudell at Boeing’s Computer Services’ Adaptive Neural Systems Research and Development project in Seattle (Azuma 1997: 359). The early 1990s’ engagement with AR was largely for aviation, engineering, and military purposes, but in the following years the potential of AR in commercial use, advertising in particular, was quickly registered by companies and their R&D departments. At the same time an increasing number of artists and authors became drawn to the possibilities of AR in their work, especially as the lower cost and wider accessibility of portable devices started making this possible from the late naughties onwards. The emergence of AR apps and browsers for both iOS and Android (for example Argon, Layar, Wikitude, and Yelp, and later Apple ARKit, Adobe Aero, and Unity) enabled the creation and viewing of AR experiences without the kind of financial resources or highly skilled specialist knowledge that was a prerequisite in the case of early AR technology.

In recent years, AR has been quickly adopted by various areas of commercial and cultural production. It has been employed by museums and heritage tourism, for example in the “Lights of St. Etienne” project by Maria Engberg, which uses an Argon AR-enabled browser to allow visitors standing in the St. Etienne cathedral in Metz, France, to choose different dated views to observe their architectural surroundings as they looked in preceding centuries (Engberg). Computer game developers have tapped into the potential of creating both VR and AR 3D apps and experiences, which allow game worlds to become enmeshed with everyday physical spaces. For example, in the 2015 location-based AR game *Clandestine: Anomaly*, the player’s home and neighborhood becomes the site of an alien crash landing (*Clandestine: Anomaly*). Nondigital sport and game experiences, too, may be transformed, like in the AR rock-climbing wall by Brooklyn Boulders and Jon Cheng, where climbers of a vertical wall view their achieved points and other information projected directly onto the climbing surface (McHugh

2016). Other applications are rapidly emerging in areas as varied as real estate, children's coloring books, furniture sales, and so forth.

While the ways in which we perceive the surrounding world are always conditioned by social, historical, political, and cultural factors, these dimensions may remain bracketed or unacknowledged constituents of what twentieth-century phenomenologists have termed "lifeworld," our immediately perceived, pre-discursive everyday experience. "Reality" is therefore a problematic term in itself, and scholars describing AR have used various terms to account for the experience into which additional elements are incorporated, like "world," "environment," "surroundings," or "actual scenery." Yet the "content" added to the perceived environment through augmented media applications adds a visible, symbolic/semantic layer to what is *already* an experience conditioned by its physical, social, and media contexts, not an unmediated sensory experience of the material world in all its fullness. In this sense, AR can also make visible many of the unacknowledged dimensions contributing to our lived environment. As the viewer of an AR work is presented with a compound image, not a representation posing as unmediated reality, this can highlight how the view into which new elements are added is itself a product of technological mediation. Rather than pure sensory experience, the immediacy of AR works is a result of *live or real-time input* in what is often an interactive engagement with the work, or a performance. Rhodes, for example, stresses that the "insistence on the live nature of the circuit belies the definition of the medium ... *live* mediation is the 'reality' of augmented reality" (Rhodes 2014: 135).

Though AR technologies and their commercial applications have been developed for some time outside the field of artistic production, a wider engagement with AR in creative arts, and the creation of AR literary works in particular, is a more recent phenomenon. In the field of digital literature, the integration of text or oral expression into (or onto) perceptual nontextual environment raises not only new possibilities for interrogating the relationship between verbal discourse and physical space but also the act of mediated perception itself. But while aural, tactile, and even olfactory perceptions are increasingly evoked in the multimodal experiences of virtual and mixed reality, an AR literary experience is still most typically an engagement with *visual* perception. In this sense AR literature, too, participates in the "visual" or "pictorial" turn of the post-1990s digital experience, to use a concept introduced by W. J. T. Mitchell (2006 [1994]). As a mixed-reality experience, AR also raises questions on the borders between literary and nonliterary forms of artistic production, or the distinction between verbal and nonverbal expression.

While all AR works share the basic idea of creating compound experiences of symbolic digital, and material or live experiences, this takes many forms, some of which have become more prominent in recent years. Scholars have categorized different types of AR experiences in

various ways. For example, Patrick Lichty has divided AR art works into five different main categories, depending on the adopted technological platforms, their relationship with the surrounding space, and their materiality: *fiducial*, *planar recognition*, *environmental*, *embodied*, and *location-based* (Lichty). *Fiducial* AR works, predominant in the early stages of AR development, use markers captured by cameras or similar devices, and objects or bodies can then be detected by the computer and used as a part of a view mixing live input and pre-programmed digital content. *Planar recognition* AR engages with posters, pages, and other flat or print surfaces, and overlays additional content on them, in a manner of what Lichty considers merely a “simple semiotic swap” (108). However, yet as Robert Fletcher has suggested in discussing Amaranth Borsuk and Brad Bouse’s epistolary poetry AR work *Between Page and Screen*—which allows the on-screen reading of graphic patterns printed on page only through a webcam—the intertwining of print and digitally created content may well become one of the most common forms of literary interaction in the future (Fletcher 2015: 59; Borsuk and Bouse). This type of AR has also been used to create remediated AR versions of more traditional literary works, like in Penguin Books’s and Zappar’s Interactive Novel versions of classic fiction works including *Moby Dick*, *Great Expectations*, and others (Farr). *Environmental* and spatial recognition AR works are based on devices recognizing certain spaces and locations, from rooms to architectural sites, and even natural landscapes (e.g., Microsoft’s *Room2Room* app, or the *Exit Glacier* project [Metz; Shafer]). *Embodied* AR experiences allow for an engagement with one’s surroundings beyond visual perception and representation, for example through wearable devices in dance performances. Finally, the growing popularity of *location-based* works is a result of a more widespread access to portable devices using GPS (Global Positioning System), which has enabled the creation of AR experiences for specific geographical locations.

Lichty’s categorization is accompanied by classifications by various scholars, at times reflecting different emphases and interests. For William Uricchio, who focuses particularly on location-based AR experiences, such works themselves can be divided into three groups, depending on whether they use fiduciary markers, digital compass tracking (including GPS), or natural feature tracking (Uricchio 2011: 31), and any of these types of works can also include embodied and environmental elements. Consequently, distinguishing different types of AR is rarely an entirely clear-cut process, and it is perhaps more helpful to understand different categories in terms of the various emphases and purposes that characterize any AR experience. It can be said that AR experiences, regardless of whether they use fiducial markers, spatial/image recognition and tracking, or wearable devices (or a combination of these) are either dependent or nondependent on a specific location. They may be specific to a place or landscape, or can be transported

to and performed in various spaces regardless of geographical coordinates, as long as the space fulfills the material and technological requirements necessary for the work. I will next focus on two AR works as examples of location-based versus transportable works that can be presented in any appropriate gallery or performance space.

Judd Morrissey's location-specific AR work *Kjell Theory* is described by the author as "a site-specific mobile Augmented Reality poem mapped visually to geo-spatial coordinates in a public outdoor space" (Morrissey 2015: 181). The work, focusing on the life of "the gay computing pioneer Alan Turing's forced chemical castration with algorithmic mutations of Guillaume Apollinaire's 1917 play, *The Tits of Tiresias*," was presented as a part of the arts program of the ELO2015 conference in Bergen, Norway. Performances and excursions were located in the botanical gardens of the University of Bergen and the grounds of the city's Leprosy Museum, and in addition to following the performance participants were able to view these locations through iPads with added images, symbols, and text superimposed on the screen's visual live feed. The work has, however, also been performed in other locations, and as indoor/gallery space performances on both sides of the Atlantic, thus highlighting the mobility and adaptability of locative AR works to multiple geographical settings.

Crosstalk (2013), an interactive performance-based AR work by media artist Simon Biggs, choreographer Sue Hawksley, and composer Garth Paine, is described by its authors as a "public/private drama within an interactive system" (Biggs, Hawksley, and Paine 2014: 61). It is not locative or location-based in the sense that it can be performed in any (interior) space that meets the technological and size requirements for the installation, which is centered on two artists engaging with each other through speech and movement, with their embodied performance transcribed by a speech-to-text software onto a large screen, in real time. The performance creates a sonic environment of human and nonhuman interaction: "As the text objects interact, they re-write each other, facilitating the emergence of new textual and sonic material, created through the recombinant computation of the texts in the collided objects" (ibid.). Like *Kjell Theory*, it depends on live, bodily engagement with and through space. However, unlike Morrissey's piece, it does not seek to place experiences or historical narratives in specific locations, but engages with digital interfaces, verbal utterance, and performance in a more conceptual and abstract manner, and can with relative ease be relocated to any indoor space of the right shape and size. Importantly, neither one of these works would simply fall into any one of the categories outlined by Lichty, for example, as they incorporate various forms of embodied engagement with the environment, and spatial recognition or coordination. Even more importantly, both have been adapted to different purposes in different locations, and no two experiences or performances of these works can be identical.

Any definition and outline of augmented reality technology and augmented reality works will inevitably be out-of-date and obsolete in the not-too-distant future; AR is, as Lichty points out, “a medium in its adolescence” (2014: 122). For Rhodes, the potential of the art form lies in its possibilities for “[making] mediation not seem real” or “[breaking] the illusion of reality in mediation” (2014: 136). Recent developments such as *Room2Room* also raise wider questions on the nature of human encounter and communication in the digital era—if 3D bodily projections are already moving mediated human exchanges beyond the voice and 2D video encounters like Skype calls, what happens when not only auditory and visual but also other sensory modes are increasingly added to these experiences, through the introduction of haptic gloves, for example? Will we soon be able to touch another human being, physically located in a separate space, or even on the other side of the globe, in our home environment? If so, how will we create and engage with fictional characters in digital narratives in the future? And how will our relationship with place and space change as increasingly realistic digital elements can be embedded in our material environments? If “augmented reality” already challenges our understanding of “reality” as the world around us, it seems inevitable that this relationship, as well as literature’s possibilities for interrogating it, will develop in hitherto unseen ways as AR technologies evolve.

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