Abstract. In this article, the authors examine the aesthetics of immersion in two emerging media forms: 360° video and 3D VR. Their goal is to move beyond addressing technical affordances, to consider the techniques and choices that producers of 360° video and 3D VR are making to exploit these affordances, and what resulting effects those viewing experiences have. They discuss the tension between transparency and reflectivity in two contrasting examples, in particular: the Danish company Makropol's Anthropia (2017) and Arora and Unseld's The Day the World Changed (2018). The authors argue that technical affordances are part of a complex process of mediation that includes both experimentation with the technology at hand and a reliance on earlier media forms. It is critical, they argue, to understand the creative tension between established forms and new ones that underscore new aesthetic and narrative experiences in VR and 360° formats.

Keywords. 360° video • aesthetics • immersion • presence • reality media • virtual reality cinema

Virtual Reality is bringing us back to the moment . . . [to] true reality. (Brett Leonard, 2018)

Discussing his 360° film Hollywood Rooftop (2018), director Brett Leonard (2018) describes 360° film and virtual reality (VR) technologies as part of what he calls 'immersive' or 'VX cinema'. VX stands for Virtual Experience; the other term, 'immersive', is more prevalent in descriptions as well as research into what is the latest of a series of waves in recent decades of computer-generated or filmic viewing experiences that offer a full 360° view. Leonard himself suggests that the new 360° video technologies constitute an 'immersive new wave' – analogous to Japanese, French and American new wave cinema of the 1950s, 1960s and 1970s – and that directors and filmmakers should use this latest technology for cinematic experimentation while taking care not to lose sight of the 'core principles of the drama, the character, and the emotion, and the story'. In short, Leonard argues that, correctly used, the new technologies
can produce work that does not foreground 360° film as a ‘technological feat’ but an ‘emotional experience’. Like other filmmakers who film in 360°, Leonard foregrounds the importance of content, of telling good stories, rather than the affordances of the technology itself. Yet, it is the capacity to create an experience of ‘watching in the round’, echoing the panorama inventor Robert Barker’s own descriptions of such viewing, that seems to make the technology of 360° video so alluring for filmmakers like Leonard. They are intrigued by the potential of the quality of a virtual visual space that takes over your whole field of view, the quality often described as immersion, a term that has different definitions across the arts and humanities as well as in computer science. When Leonard describes his experimentation in this new cinematic medium, a tension emerges between the curiosity of having a completely open space in which viewers can see everything and the desire to maintain directorial control over the frame – between a sensory-driven immersion into a story-world and a cinematically more traditional framed perspective that offers a different sensory and intellectual sense of immersion. For Leonard, 360° video ultimately offers an interesting challenge for contemporary storytelling.

In this article, we explore how the inherent tension of working in a new medium with a set of practices that were honed in a different medium plays out in contemporary fiction and documentary work in both 360° video and interactive, 3D VR. We disregard the hype that surrounds VR and 360° video (sometimes called immersive media), to see how technological advances in consumer-grade head-mounted displays and mobile devices are now able to create experiences for a general audience. Although the two technologies – 360° video and VR – are distinct, they both fall under a category we call ‘reality media,’ that is, media forms that redefine our perspective of lived experience and of the spaces which we physically inhabit. We will discuss the representational and aesthetic strategies of VR and 360° as examples of reality media – and how they remediate earlier media and media forms. We argue that technical affordances are part of a more complex process of mediation that includes both experimentation with the technology at hand and a reliance on earlier media forms in aesthetic and narrative choices.

**Presence and immersion**

In the 1990s, VR developed its own research community in computer science and, from the outset, presence and immersion became the measures and the often elusive goals of VR. Most VR systems included ‘a computer capable of real-time animation, controlled by a set of wired gloves and a position tracker, and using a head-mounted stereoscopic display for visual output’ (Steuer, 1992: 74) The alternative construction was a VR ‘cave’, whose walls were large computer screens. In either case, the computer graphics environment would physically surround and envelop viewers. The question was whether they would believe in the computer graphics (CG) world that they saw. Would they
choose to ignore that they were actually sitting or standing in a laboratory, wearing technology over their eyes that was producing the images? Would this immersion lead to a feeling of presence?

Immersion and presence became the twin metrics of virtual environments. Immersion was characterized as ‘the extent to which the computer displays are capable of delivering an inclusive, extensive, surrounding, and vivid illusion of reality to the senses of a human participant’ (Slater and Wilbur, 1997: 3). Immersion was thus a matter of the sensory engagement, while presence was a psychological state. A leading journal with the title Presence: Teleoperators and Virtual Environments appeared in 1992 and, in one of the articles, one of the founding editors defined presence as the feeling of ‘being there’ (Sheridan, 1992). Several other formulations followed (Lanier, 1992; Steuer, 1992). In 1997, two communications researchers, Lombard and Ditton, surveyed the field and identified a number of definitions of presence (Lombard and Ditton, 1997). These definitions were not mutually exclusive, but they emphasized that different aspects of VR could condition how we perceive and experience the virtual world. We can group the definitions into two categories: (1) individual perception of the world, and (2) social interaction and engagement with others. Some of the definitions are now a commonplace in both popular and scientific discussions on VR. One example is presence as transportation: mediations that seem to take us to a different time or place. VR is not the first medium to transport us. A film, a novel, or a story can (in fact, usually does) take us metaphorically to another time or place. But VR today makes a special claim to transportation because of its encompassing and dynamic representation of ‘there’: its 360° computer graphics environment with the capacity for user interaction. Another is presence as sensory immersion (or deprivation): VR surrounds you, engulfs you. A head-mounted display with headphones and handheld controllers creates a mediated environment that is meant to fully occupy your attention. There is nothing that you see other than what the computer draws and, if you are wearing earphones, the system’s audio mutes the outside world more or less completely. In most current systems, your sense of touch and proprioception (embodiment) are not completely engaged, but the controllers focus your attention at least to some extent. VR hardware and software are constantly being improved to sharpen the sense of perceptual immersion. Better screens and dedicated Graphics Processing Units (GPUs) produce higher resolutions and faster frame rates, so that objects in your field of view look smoother and their motion more continuous. A wider field of view in the headsets allows you to see more of the world at once, while faster computers and better sensors mean that the images will not lag or swim when you turn your head quickly.

What the various definitions have in common – and this is an assumption shared by the VR research community in general – is that they discount the notion that VR is a medium. As the name ‘Virtual Reality’ implies, the goal of VR would seem to be to give the viewer an experience that is the equivalent of
presence in the ‘real world’. The VR community does not think in philosophical terms about reality, but simply assumes that the perfect sensory reproduction of reality is desirable and theoretically possible.

Unlike 3D VR, 360° videos (also called ‘VR videos’ or ‘VR cinema’) are not typically generated in real time. Furthermore, the terms ‘video’ and ‘cinema’ indicate that this form of immersive experience acknowledges its nature as a medium. Just as a traditional movie consists of a set of photographic images, so a 360° video consists of a set of panoramic images, each of which is usually an equirectangular projection. Each image is stretched out over 360°, like a static panorama. The viewpoint stays in the center and, even if viewers move in any direction, the images do not follow. Visually, they remain at the same spot with the surrounding visual space appearing at the same distance from them at all times. There may nevertheless be interactive elements, usually triggered by viewers pointing their gaze in a particular direction. For instance, a focused eye at the bottom of the image in the VR iPad experience, Notes on Blindness: Into Darkness (Nihilo et al., 2016), transports you back to a menu.

As the painted panorama remediated the perspective painting and the photographic panorama remediated the photograph, so 360° videos are clearly remediations of film; 360° videos occupy an intermediate position between traditional ‘flat’ film viewed on a rectangular screen in a theater and true computer-graphic VR. When they are pre-recorded, 360º videos lack the capacity for the real-time interactivity of 3D VR. But they do offer viewers greater control over their point-of-view than traditional film, where the director, cinematographer and the editor decide both what viewers will see and from what angle they will see it. In 360° video, the creators lose some of the traditional film-making strategies or characteristics regarding camera angles, continuity, cutting, close-ups and composition – the 5C's of cinematography originally identified by Joseph Mascelli (1998) in his classic work on the subject. Some of the 5 C's are still available in 360º films, especially in the areas of continuity, cutting, and composition, but they are deployed in different ways from how they might be employed in traditional film. Filmmaker Gabo Arora (2018) has spoken of the difficulty of learning how to edit away camera equipment and people or to hide them behind objects on the set. These manipulations, however, show how the placement of the 360° camera(s) and the process of defining where the center will be remain under the filmmaker's control. In Man on Spire (Chin and Solomon, 2016), Jimmy Chin ascends the 408-foot-tall spire of One World Trade Center with a 360° camera rig. In the vertiginous shots from the top of the spire, when viewers look down, they do not in general see the camera, although a few traces still remain in the film despite the directors’ best efforts: a slight shadow, part of a beam.

More expressive work is currently being done in 360° video than in 3D VR, and this work remains anchored in the traditions of the cinematic medium. In
some cases, producers are employing strategies that remediate earlier media forms, especially film, because many of the producers come from that tradition and are still working within that community. Indeed, many important film festivals, such as Sundance, Tribeca, the Toronto International Film Festival, and the Sheffield Doc/Fest, now have VR sections. In other cases, theatre provides an important influence on production strategies and views on 360° and VR as media forms.

Unlike the VR research community in computer science, experimental videographers, popular writers, and some media theorists have adapted a rhetoric of immersion and presence that acknowledges the importance of the medium, both in expressive VR and in related forms such as video games (Calleja, 2011; McRoberts, 2017; Thon, 2014). Oliver Grau (2003) has argued that immersive experiences of perspective painting, panoramic exhibitions, and certain kinds of photography and film can all be viewed as precursors to VR. In videographer Chris Milk's (2015) TED talk, he suggests that immersion is what makes VR (he actually refers to 360º video) ‘the ultimate empathy machine’, a notion that is often repeated by makers and scholars alike. As we have argued elsewhere (Engberg and Bolter, 2017), Milk asserts a causal link between deepened emotional engagement and the camera’s all-seeing point-of-view, which creates a visual 360° space that seemingly hides nothing from viewers. In Milk's view, if we see what someone else sees we can know what they know and, crucially, feel what they feel. Milk is not describing the complete lack of mediation that Lombard and Ditton (1997) regarded as the basis of claims of immediacy and immersion in the VR research community. For Milk, VR as a cinematic medium proffers a presence and empathetic engagement that emerges through a combination of the affordances of the technology and a particular set of representational strategies.

For VR researchers, then, sensory immersion and psychological presence are relatively unproblematic metrics of technological progress. Filmmakers and new media enthusiasts offer a more nuanced explanation, in which 360º video (and potentially 3D VR) are understood as new media forms that can achieve presence and emotional engagement through immersion. However, even this explanation treats viewers as somewhat naive subjects, who forget the circumstances of viewing and ‘fall into’ the mediation. We suggest that the viewing experience of 360º video and 3D VR can have greater complexity and sophistication.

**Reality media**

We define *reality media* as those media forms that explicitly interpose themselves between us and our visual, auditory, or tactile perception of the everyday world and in this sense seek to redefine reality itself (Bolter et al., forthcoming). We are not discounting the power of media forms such as poetry
and prose fiction to redefine reality through metaphor and verbal narrative. But with the term 'reality media', we mean to designate a class of audiovisual media such as film and television, as well as Augmented and Virtual Reality and 360° video that do not rely on imagination and inner visualization of worlds presented via text, but instead assert their physical presence in the world we inhabit. These media forms appeal to our senses, sometimes choosing to emphasize one sense over the other in the design of the experience. The 2016 documentary Notes on Blindness tells the story of John M Hull who records his sensual and intellectual experience of the gradual deterioration of his sight. The accompanying application Notes on Blindness: Into Darkness (Nihilo et al., 2016) is described as an immersive VR experience of that process, and is a good example of how visuals and sounds can combine to form a powerful narrative space in which the visuals play a minor role.

As Kracauer (1997[1960]) suggested, it is a mistake to suppose that any medium's connection to reality could purely be based on the properties of that medium. We choose the term 'reality media' to emphasize their nature both as mediating technologies and as elements in our contemporary media economy and culture. As a reality medium, VR resembles cinema (especially as it was originally experienced, in a darkened theater), while, as we have noted, 360° video is situated between 3D VR and traditional film. With film, 360° video and VR, you make the decision to step outside your daily life for a period of time and step into a fashioned reality. In this sense, these new reality media, like cinema, are 'special events'. Like these earlier reality media, VR and 360° video seem to make a claim that they bring us closer to reality.

We need to appreciate the double logic of such a claim – the way in which reality media configure our perception of the world both through sensory input and through media representation. With regard to film, there is the often told and almost certainly apocryphal story of the first viewing of the Lumière Brothers’ cinématographe in Paris in 1896, particularly during The Arrival of the Train at La Ciotat Station. Film historians doubt that an audience of sophisticated Parisians at the turn of the 20th century could be fooled into thinking that a train could suddenly materialize and crush them. They were astonished, not fooled, and what astonished them was that moving images could seem so real (Gunning, 1995). Neither those early films nor the emergent 360° videos or 3D VR could succeed in deceiving their audiences into believing that they are having an unmediated experience. But that is not necessary for the sense of astonishment – the La Ciotat effect – nor is it necessary for the sense of presence and engagement. Presence can be evoked even though the viewer never completely loses consciousness of the process of mediation.

Reality media do not bring us closer to the ontology of the real world; instead, they always work by comparison. As Gunning showed, the La Ciotat screening announced film as a new reality medium in 1896, the audience was astonished
for two related reasons. They were comparing what they saw on the screen to their experience of everyday life. At the same time, they were comparing what they saw on the screen to other media that they knew, particularly photography. The film was photography in motion, and so it looked more like a moving train than any medium they had seen before. As Richard Rushton (2011: 26) has shown, cinematic reality is aligned with Gunning’s suggestion that a film such as La Ciotat provided the spectators ‘with the reality of cinema’s illusory mechanisms’. From that moment on, reality was redefined because a new reality medium now existed that gave us a new perspective on the real. Cinema is not ‘an aspect of reality’ which Walter Benjamin argues is ‘free of all equipment’ (Benjamin, 2019[1969]: 185). What we are calling the La Ciotat effect (with its implications for digital media) has been characterized in various ways by film theorists, including Jeong (2013) and Strutt (2019).

Following Ryan (2015), we could argue that all mediation gives a perspective on the real and that VR and 360° video bring us to a new stage of reality media.

Aesthetic strategies of reality media

Each reality medium mediates and remediates. Each works on our physical senses, as well as our imagination, offering us a new representation of the world that we implicitly compare to our experience of the world in itself and through other media that we know; 360° video and VR technologies are now used in journalism, for documentary purposes, short form fiction and interactive experiences. In November 2015, The New York Times released The Displaced, a collaboration between With.in (then VRSE) and the Times’ new initiative, a platform for 360° content, nytvr. Along with this release, The New York Times also shipped to all its subscribers Google Cardboard, a simple headset that turns a smartphone into a VR viewer. The film borrows from existing strategies in documentary filmmaking, including on-location filming in South Sudan, Ukraine, and Syria. In The Displaced and other similar 360° videos, such as Clouds Over Sidra, the often mentioned 360° documentary, the camera is an invisible center, viewer’s point of view. Viewers can spin around and see the whole site. It is an unframed experience, unlike a documentary shot with a camera that frames the scene. However, the direction of the gaze is implied by creating foci of attention with the filmed subjects or sounds, or by introducing cuts from one site to another. Why 360° then, rather than ‘flat’ film? In Clouds Over Sidra, the camera follows 12-year-old Sidra in her everyday life, bringing viewers along with her: into her school, a gymnasium, a bakery, and the tent that is now her family’s home. One of the main goals of this kind of 360° film is, in the words of director Gabo Arora (2017), ‘not storytelling; it is story-living’. He argues that traditional photography does not provide a strong enough connection to the children and their plight in order to elicit emotion, compassion and ultimately action. Photography and film just do not work any more; Arora claims that, in a media-saturated world,
we are long since numb to these kinds of visuals.

Such claims reflect the overly optimistic belief in the newer media forms’ ability to convey their messages better than other media. As media scholars such as Gitelman (2006), Chun and Keenan (2006) and Bolter and Grusin (1999) have long reminded us, the exaggerated rhetoric of earlier media’s obsolescence is a step in the now-familiar process by which media technologies develop, establish themselves as media channels and are then superseded (but not always made redundant) by new media. In terms of media history, the connection of VR and 360° photography and videography to panoramas in the 18th and 19th centuries (with their all-encompassing illusions of far-flung places and exciting scenes) have been noted many times (Grau, 2003). The New York Times’ 360° film The Fight for Falluja (Solomon, 2016) certainly shares an affinity with the battle scenes of Louis Braun’s (1885) panorama Battle of Sedan or Felix Philippoteaux’s (1873) The Siege of Paris. The aesthetic strategies of 360° documentaries clearly borrow from both documentary film and panorama: the allure and excitement of seeing a far-flung scene represented in front of you, the sense of seeing things as they happen, the appeal to the verisimilitude of the representation. At the same time, neither viewers of the 18th-century panorama nor the contemporary audience of a 360° documentary are tricked into believing that they have been transported to a different world, that they are having a non-mediated experience. Murray (1997) invoked the imaginary holodeck from the science fiction franchise, Star Trek, to characterize the ultimate potential of virtual reality: a computer-generated virtual environment that would have the power to fully fool those who entered into it. But VR never functioned that way even in the Star Trek universe. When any of the illustrious Star Trek crew stepped into the holodeck, they knew that what they were experiencing in that space was mediated. Somehow, though, the experience did not cease to amaze. The historic panorama and contemporary 360° video and VR function under that same double logic, although we are far from the perfect representations that Star Trek’s holodeck offers.

**VR cinematic experiences**

It is clear from works in 3D VR and 360° video that artists are experimenting aesthetically and technically with how to understand them as media forms, querying what it means to have an ‘immersive experience’. Works such as The Day the World Changed (2018) by Gabo Arora and Saschka Unseld, and Anthropia (2017a), as well as Doom Room (2017b) by the Danish film studio Makropol, make mixed reality experiences that intertwine interactive VR with 3° to 6° of freedom with 360° videos, alongside live performances by actors on theatre-like sets that the audience members navigate through.
**The Day the World Changed: VR as a shared experience**

You open your eyes, wearing a rather heavy head-mounted display with cords hanging off it, a backpack on your back, and you're holding controls in your hands. It is a disorientating experience to find yourself suspended in space – bodiless, as you look down, expecting to see a body, feet standing on something. Instead, Earth in its spectacular green, blue and white colors is spinning in front of your field of view. If you turn around, there is nothing but a dark, near empty space. You feel a little nauseated when you seem to fall, ever faster, to the planet's surface. Then a loud bang shatters the visual space in front of you and you find yourself in darkness, with a sinking feeling in your gut that something awful has occurred.

We first experienced Gabo Arora and Saschka Unseld's *The Day the World Changed* (2018) as part of the Alternate Realities Exhibition at the Sheffield Doc/Fest in 2018. The installation was meant to be shared with others (during our experience, four viewers participated in one viewing), and the first thing you see are in fact the ghostly gray apparitions of the other players in an otherwise dark space. Then, suddenly, you seem suspended, bodiless, in space with the planet Earth in front of you. In a sequence of scenes, you are told about the history of atomic bombs while also experiencing the devastating effect the bombs had on the Japanese cities of Nagasaki and Hiroshima. The overall color tones of the work are dark: shades of gray and brown are dominant. Black and white photographs and newsreel footage of the aftermath of the 1945 bombing of the Japanese cities appear in several parts of the work. The narration, damning in its matter-of-factness of the resulting human loss and anguish, urges you to understand atomic weapons' continued destructive power and ultimately seeks to compel you to action. Overall, the work is impactful and poignant in its clearly political aim to raise awareness about the continued dangers of nuclear weapons. Aesthetically, *The Day the World Changed* operates with various scales that move and shift the viewers' point of view continuously. At the beginning, your point of view takes in the whole of the planet as you are suspended in space. At various times, you are able to survey continents as you are presented with facts about atomic bombs. This all-seeing position is later replaced by a more human scale, as your body is represented by ghostly gray outlines and you can see those of your co-viewers inside the work's VR space. Anchored in this virtual body (and holding VR controllers), you are able to reach out and manipulate digital objects as you stand in a bombed-out building in Hiroshima. As you do, you hear the story attached to each object – a mother speaking of a dead son's lunchbox. The gravity of the global becomes manifest in the anguish of personal loss, and you are asked to bear witness.

In Arora's words, *The Day the World Changed* is part of his continuous work to establish the 'grammar of VR' (Fernandez, 2019). Part of that grammar is,
for Arora, the potential of a shared or social experience in a medium that so far has favored single-user viewpoints. Unlike most 360° and VR experiences today, historical panoramas were shared experiences in which the viewers entered purpose-built rooms or even buildings in order to experience the spectacle that panoramas provided. The very design of a VR head-mounted display or a smartphone head mount such as Google Cardboard in front of our eyes invites a solitary experience. Filmmakers like Gabo Arora and Brett Leonard have nevertheless foregrounded the social potential of VR that melds classic cinematic techniques with the affordances of VR. Leonard (2018) speaks of VR’s ultimate potential as ‘true connectivity’ across cultures; Arora (2018) believes that VR will transform our world because of the possible social impact that powerful shared VR experiences can have. The challenge for these filmmakers, one could argue, is then to create works that prove their ambitious claims for these newer reality media forms.

**Anthropia: combining 360° video, VR and installation art**

‘Do you trust me?’ the girl in white socks and Bermuda shorts asks you. She is looking up at you where you are standing in bare feet on a box covered with shockingly green Astroturf. ‘Sure’, you say, without meaning it. She places a headset on you, and a backpack with a computer on your back, explaining that we will now have to calibrate the view. It takes a few tries before the white statue that you see in front of you actually aligns with the white statue you see in front of you in the virtual world. You walk toward the statue. You have a golf stick in your hand. You know it is a golf stick because you can see it in the virtual world, and somehow the weight of it in your hand and the way it feels when you swing it convinces you that the physical object aligns with the virtual object. ‘Ah, I see what they did there, with the statue’, you think. It is time to play miniature golf. You walk slowly, feeling the texture of the ground underneath your naked feet. The ability to ground yourself, to curl your toes against the physical material underneath, helps you trust the virtual world you see, despite its sketchily outlined features. There is a hole to play, and after a few tries you manage to set the virtual ball rolling. When it reaches its target, this true VR world disappears and you find yourself inside a 360° film instead.

There are five of these films in Anthropia, the installation that you are experiencing. One of them in particular has a strong effect on you. You are getting used to the golf game and, as you yet again strike the ball in the hole, you are prepared for a 360° film. This time you are asked to lie down, which you are reluctant to do. Sitting down, standing up or turning around your own axis as you have done thus far is fine. Lying down feels vulnerable and uncomfortable with the backpack. The first part of the film offers only sounds. Someone is breathing in the darkness. Eyes open and you can see a man in
plastic protective coveralls leaning over you. You cannot see very much even if you try to turn around. Then you find yourself in darkness again. This is a person who is lying down, closing and opening their eyes. You can hear their breathing. The pitch of the breathing and a few quiet moans lead you to think it may be a woman, but that can be an over-interpretation. There is more than one man around them/you. They have blood on their coveralls, and they sort of speak to each other you think but you cannot hear what they are saying. This point of view makes you feel as if you are that person on the floor and their breathing that is quickening, and feels as if they are afraid and is starting to affect your own pace of breathing. At one point, the men are dragging them/you: you are lying on a piece of plastic. And, then, they fold the plastic over their/your face and the breathing now becomes panicked. The scene is clear to you, of course; this is a straightforward genre piece of a murder scene, recalling all kinds of films and TV series for you as you are watching. The narrow and enclosed field of view, the first-person viewpoint, the sounds of breathing close to your ears, however, make all the difference, and you find yourself struggling to maintain a distance between the representation and your own perception of the world around you. And then, just as you think that you will be unable to control your breathing any more, you are back at the miniature golf course again.

Anthropia by Danish Makropol and five collaborating artists (Johan Knattrup Jensen, Therese Willstedt, Rikke Benborg, Ali Abbasi, and Julian Juhlin) is called both a VR installation and an art installation. It comprises five 360° films placed into a VR setting that requires the viewers to navigate the VR space in order to be able to watch the 360° films, without knowing what will come, how long the experience will last or where it may lead them next. Although perhaps visually affecting, at no point will viewers forget that the viewing experience comes by way of an apparatus that is weighing on their head and back. Although perhaps encumbering and awkward at times – both the technology and the representational strategies are working out their kinks – Anthropia does offer a viewing experience that sets you apart from your perception of the lived world, while still maintaining certain important anchors (the feet feeling the ground, the hand holding a physical stick, your sense of proprioception as you walk, sit and lie down). In the reality media of 360° video and VR, you are engrossed by what you see and hear, but you are made aware of the remediations of cinematic form and genre at the same time. Attempting to push at the boundaries of what the medium can do at this point, the VR sections in particular seek to work with viewers’ physical sensations of proprioception and touch, whereas the 360° films work with aesthetic genres and practices for its effects; what you see and hear. It is the combination of these two that makes up reality media’s most alluring effects. It is also in the combination of technological affordances and aesthetic strategies that the challenges of working in these new media forms lie.
The La Ciotat effect in 3D VR and 360° video

Both The Day the World Changed and Anthropia illustrate the double logic of 360° video and VR as reality media. Their aesthetic effect depends on (the claim to) sensory immersion and on the ways in which they recall earlier media forms and genres. In describing the aesthetics of VR and 360°, we have invoked the historical lineage from earlier reality media: from the painted canvases of 18th-century panoramas to panoramic photography of the early 20th century and, further, to today’s still and video imagery. Each reality medium pursues a different path to its postulated transparency, emphasizing different facets of reality that it can imitate. Each borrows from other media and, at the same time, promises to surpass other media to achieve presence. Each offers different possibilities to subvert the reigning aesthetic codes to achieve other effects that work toward presence. At the level of individual works, we can already see well-known cinematic strategies that appeal to immediacy and immersion repurposed for the new medium (the 360° documentaries) or use the defamiliarizing effects of hypermediacy (The Day the World Changed or Anthropia). VR and 360° video cannot deceive their viewers into believing that they are having a non-mediated experience. But that is not necessary for the sense of presence or to produce a reaction. The La Ciotat effect can add to, rather than attenuate, viewers’ sense of engagement.

Understanding VR and 360° video as reality media underlines the material forms of the technologies that are used – in particular, their sensory, proprioceptive, and interactive properties. Earlier reality media generally demanded less interaction from their audiences, and therefore it is tempting to assume that computational media forms that permeate our current cultural moment represent a radical break from perspective paintings, cinema, video, and TV. Equally important for the overall experience and understanding of 360° video and VR experiences are the remediated representational strategies that are used. In the case of 360° video and VR, as in the case of film, there is often (perhaps always) a gap between the rhetoric of exponents (critics and practitioners) and the actual aesthetic effects of the medium. Their claim is that the new medium can achieve an ideal of sensory immersion and emotional engagement. The experience of the viewer, however, follows a double logic in which immersion and engagement are never unalloyed. The viewer always maintains some degree of awareness of the medium and the conditions of viewing.

Rather than denying this doubling, the most interesting artists working in the new medium acknowledge and explore the process. In Anthropia, the encompassing VR environment provides participants with a double of the physical world, while the 360° videos recall various filmic genres in a process of remediation, which always involves doubling, duplication with a difference. There is of course a long tradition of the double as a motif in literature and
film. In the 19th century, obsessed scientists and magicians started making doubles, at least in literature such as Mary Shelley’s *Frankenstein* and ETA Hoffmann’s *The Sandman*. It was *The Sandman* that Ernst Jentsch and then Sigmund Freud invoked in their early 20th-century essays on the uncanny. 

And it is a striking coincidence that, in recent decades, computer graphics specialists have adopted the term *uncanny valley* to describe computer graphic representations that fall short of perfection. Human figures in a computer graphic scene are regarded as uncanny when they resemble human beings well, but not well enough. That is, they are not quite photorealistic. Computer graphics in video games and VR applications often reach this point: humans and animals are eerily close to what we see in live-action films, but not quite there. In other words, they are doubles, but not perfect duplicates. The ostensible goal of computer graphics for video games and VR is to get through the uncanny valley to perfect photorealism.

We are suggesting that this is a naïve view, the digital media equivalent of imagining that the goal of film was to fool the *La Ciotat* audience into believing that the train was going to crash into the hall. Instead, as Gunning (1995) argued, the audience had the uncanny feeling that what they saw on the screen was both unreal and illusion at the same time. In this sense, the uncanny is a quality of all reality media. Uncanny doubling is implied in the very phrase ‘reality media’ because the ‘medium’ always doubles ‘reality’ without duplicating it. VR and AR are uncanny, and so are film, television, and photography, each measured by the standards of their contemporary media world. There is no escape from the uncanny valley.

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**Notes**

1. From business-driven models of how new technologies are established, such as the Gartner hype cycle on emerging technologies, VR has slid back and forth between failure and success (Gartner, 2019), to measurements of investment into VR technology and content, VR has seen several high and low points since the 1980s consumer introduction to VR. There have been numerous accounts, particularly in popular press and trade magazines, of VR’s potential (see, for instance, Jenkins, 2019).

2. The documentary was directed by Peter Middleton and James Spinney, and the VR application was produced by Ex Nihilo, ARTE France and AudioGaming, in co-production with Archer’s Mark.

3. *The Displaced* was branded as VR, but in fact it was a 360° video documentary.

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