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'Go Outside and Play It!': A Scenographic Approach to Finding Aura in Sci-Fi, Cli-Fi, Augmented Reality Art Game, *Sin Sol/No Sun*

Thea Pitman 

School of Languages, Cultures and Societies, University of Leeds, Leeds, UK

ABSTRACT

This article seeks to explore the affordances of certain new media applications for generating environmental affect, and hence possibly effect, in those who use them. It specifically aims to examine the use of augmented reality (AR) and movement/space-sensitive technologies in the science-fiction, climate-fiction, mobile art game *Sin Sol/No Sun* (2018–2020), made by Latina media and performance artist and theorist micha cárdenas and her team at the Critical Realities Studio at the University of California, Santa Cruz. Sidestepping arguments about the nature and degree of immersivity afforded by different media and how this may, or may not, correlate with environmental engagement, it focuses instead on questions of embodiment and the potential for the development of 'aura' in spaces mediated by AR, and how these may potentially help promote pro-environmental affect. More specifically it argues that *Sin Sol* contrives to restore the aura of our environment in a relational way, through a design that is purposefully open to the player's auratic free associations. It seeks to demonstrate this by means of a provisional, personal, scenographic account of my multi-sited attempts to experience the game to try to tease out the implications of this kind of eco-poetics.

KEYWORDS

Computer games; mobile technologies; augmented reality; embodiment; aura; pro-environmental affect

hello. / he- / hell- / hello / i- / i- / iii iii- / iii iiiiii- / am so happy you are here. / It worked! / months, years studying the algorithms of / intelligence, sentience, presence, / I finally figured out how to breathe / how to break out of the loop I've been caught in.

(Aura's opening speech, micha cárdenas et al., Sin Sol/No Sun, 2018-2020)

What, then, is the aura? A strange tissue of space and time: the unique apparition of a distance, however near it may be. To follow with the eye – while resting on a summer afternoon – a mountain range on the horizon or a branch that casts its shadow on the beholder is to breathe the aura of those mountains, of that branch.

(Benjamin 2008 [1935], 23)

Touch to Begin . . .

I'm sitting at my desk, in my office, at home. It's late Spring. I've just downloaded an 'Augmented Reality game' app to my iPhone, attracted by prior knowledge of the lead

CONTACT Thea Pitman  t.pitman@leeds.ac.uk  University of Leeds

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designer's work and the information available on the webpage dedicated to the new game that she has made (cárdenas et al. 2020a). I click to open it up, enable use of the camera, flip my phone to landscape orientation as this is what the homescreen seems to require to be able to see the graphics comfortably, and press 'touch to begin ...' (Figure 1). On the next screen I can see four 3D Lego-like 'plants' with cerulean blue leaves and tendrils and steely grey outer casings. These appear in the lower part of my field of view if I hold my phone perpendicular to the ground. The nearest one opens up and starts to move its petals and sprout tendrils, attracting my attention. I can also see matching blue writing 'hanging in the air' nearby each plant, a 3D model of a white border collie with a metallic purple mane, and a strangely angled, semi-transparent 2D 'screen' of what seem to be trees (Figure 2). And I can hear eerie synthesizer music that builds dramatic tension.



Figure 1. micha cárdenas et al., *Sin Sol/No Sun* (2020), homescreen. Screenshot on iPhone ©Thea Pitman.

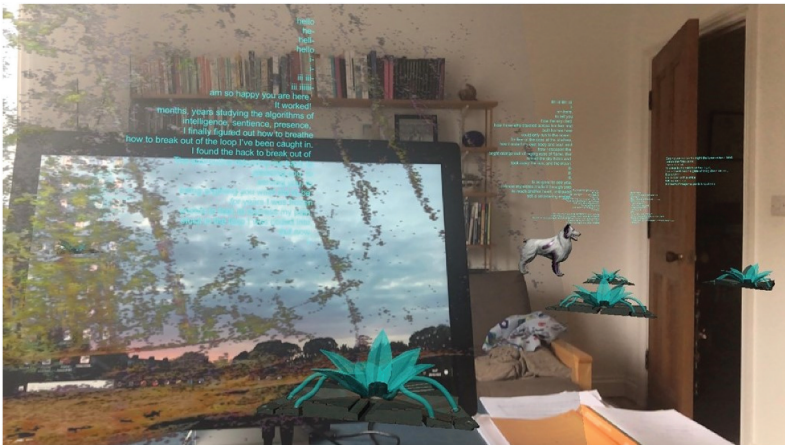


Figure 2. My first view of *Sin Sol* from the comfort of my desk. Screenshot on iPhone ©Thea Pitman.

But the screen is not entirely filled with digital content and I can still see my desk, computer, books through the camera viewfinder, as well as hear voices off. Everything seems very cluttered and I'm not at all sure what to do to 'play' the game. I swivel in my seat to see if there is anything else that I can see through the viewfinder to engage with, but find nothing. I turn back to the plants, dog and writing. I can just about read the nearest text, but not the others, and I intuit that I need to get closer to them. So I get up out of my seat and step forward, moving out towards the landing.

As I approach the first plant, a glitchy, 3D, animated model of a woman with dark skin, a curvaceous body, dark purple hair, and cerulean blue eyes and dress emerges from it in a swirl of blue, white and pink pixel effects (Figure 3). She performs the corresponding poetic text (epigraph 1), celebrating our new connection. But I am stuck up against the bookcase by the door. Once the performance is over, the figure flops forward and disappears, and the outer casing of the plant folds up again, but I cannot easily move on to the next plant to continue the story. I go downstairs and try in the kitchen but quickly get stuck in a corner again ...

And so, with a certain amount of hesitation I confess, I come to realise that my best option is to head out to the park by my house in order to have enough space to carry on playing the game. Of course, this is exactly what the game intends for its players to do. Although instructions within the game itself leave players to intuit the need for this course of action, the final line of the description on the App Store, for those inclined to read all terms and conditions, does suggest that the game 'works best in an outdoor, open space, where you can walk around to navigate through the story' and, in a conference presentation about the work, its lead designer specifically exhorted players to 'please download it, put it on your phone, go outside and play it!' (cárdenas 2020).

This requirement to go outside is important, and not just because the game design requires movement in a significant amount of space to play it. The game itself is about ecological collapse: the main character, Aura2019, is an 'AI hologram' (cárdenas et al. 2020b) who is contacting me from a not-so-distant future and wants me to piece together



Figure 3. Aura2019 emerges from the nearest plant as I approach. Screenshot on iPhone ©Thea Pitman.

the vividly poetic fragments of her story of how the planet died — massive forest fires, consequent air pollution, humans struggling to breathe and isolated in their individual ‘pods’ because the air is too toxic to go out, especially for the clinically vulnerable. These narrative fragments also intersect with her memories of self-discovery and violent repression as a trans woman, as well as her positionality as a Latina and her sensitivity around issues of race, immigration and disability. By making me go outside, I am implicitly encouraged to compare and contrast my own positionality in my real environment with that of *Aura2019*, as well as the state of my real environment, both as it is framed by my viewfinder and through my heightened sense of physical embodiment therein, with her poetic evocation of the end of the Anthropocene in the virtual environment of the game. My present moment, furthermore, corresponds roughly to the time of her memories of climate breakdown,¹ thus making the compare and contrast exercise even more compelling. Can I spot the signs of climate breakdown all around me? Or should I try to appreciate the natural world more deeply and with greater urgency given what might soon happen? I am inclined to do the latter. The game thus encourages me to pay close attention to otherwise unremarkable features of the everyday, outdoor spaces that I subsequently encounter, such that I perceive them to have taken on a Benjaminian ‘aura’; an affective response that may just push me to change my approach to the environment so that we can all keep breathing.

This article seeks, therefore, to explore the creative affordances of certain new media applications for generating pro-environmental affect, and hence possibly effect, in those who use them. It specifically aims to examine the use of augmented reality (AR) and movement/space-sensitive technologies in the sci-fi, cli-fi art game app *Sin Sol/No Sun* (2018–2020)² described above, made by Latina media and performance artist and theorist micha cárdenas³ and her team at the Critical Realities Studio at the University of California, Santa Cruz, using the industry-standard videogame software programme, Unity, and designed for use on iOS platforms.⁴ The article endeavours to sidestep arguments about the nature and degree of ‘immersivity’ afforded by different media, and how this may, or may not, correlate with environmental engagement.⁵ It focuses, instead, on questions of embodiment, affect, and the potential for the development of aura in spaces mediated by AR, as outlined by Bolter et al. (2006), and how these may help promote pro-environmental behaviour. It also seeks to avoid technological determinism by being exceedingly cautious in the claims that it makes about the affordances and possible implications of what some scholars prefer to call ‘embodied’ rather than ‘immersive technologies’ (Jackson 2020), achieving this by means of a provisional, personal, scenographic (Thornett 2020) account of my multi-sited attempts to experience the game to try to tease out the implications of this kind of eco-poetics.

Mobile Media, Augmented Reality, Computer Games and the Aura of Everyday Spaces: New Forms of Creative Engagement with the Environment

While ecocriticism started life as a branch of literary criticism in the 1980s and 90s, it has more recently shifted to embrace a much wider range of cultural production, as seen in the development of the critical field of ecomedia (cf. Woolbright and Oliveira 2016). The question that looms large over this development, despite the dangers of technological determinism, is precisely what difference digital technologies and the new forms of media

that they make possible might make in comparison with other more traditional forms of media such as printed books or films. As Andrew McMurray writes in 'Media Moralia: Reflections on Damaged Environments and Digital Life', '*Literature*, the lodestar of ecocriticism from its inception, helps us understand what sort of creatures we are to knowingly immolate ourselves and the planet' (2014, 2). However, he goes on to argue that, 'Ecocritics must now look to our newer mediums of record: television, film, computer-based media, and more broadly, the digital *datasphere*' in order to determine whether 'new media could foster awareness, transparency, compassion; they could put us in touch with the unseen things; they could show us the way the world is ending and empower us to save it' (McMurray 2014, 2–3).

McMurray's optimism for the potential of new media contrasts refreshingly with all the doomsayers who have pointed to its inextricable imbrication with increasing extraction of natural resources, energy consumption and creation of vast mountains of WEEE (Waste from Electrical and Electronic Equipment, or e-waste for short) as a clear indication of its inherent anti-environmentalist credentials,⁶ as well as those who have tended to see such technologies as distancing us irredeemably from the real world out there beyond our screens (see, for example, Bill McKibben's *The Age of Missing Information* [1992] or Laura Marks's assessment of new media in *Touch* [2002, xi-xii]).⁷ Furthermore, his focus not just on matters of representation, but also the fostering of engagement and agency amongst users, sits well with recent developments in 'affective ecocriticism', or how cultural products can promote pro-environmental behaviours thus 'moving' users to action (Bladow and Ladino 2018). Nonetheless, the question still remains: but how?

While it would be biting off far too much to attempt to answer such a question for all forms of new media and the technologies that underpin them, I am particularly interested here in the exponential growth, since the mid-2000s, of wifi-enabled mobile devices such as smartphones and tablets, in conjunction with locative and movement/space-sensitive technologies such as GPS (Global Positioning System), LiDAR (Light Detection and Ranging), gyroscopes, accelerometers, depth-sensors, and so on,⁸ as well as related augmented and mixed reality applications and the games that can be designed to work with some or all of these devices and technologies. As Scott Rettberg argues, 'Other than the Internet, the most significant change in our relationship to computational technology in recent years is the increasing ubiquity of mobile devices and locative technologies' (Rettberg 2019, 183).

These technological developments are important, according to Rettberg, because of the way that they change 'the nature of our interactions with both the physical world and the Internet' by, for example, integrating Internet-enabled technologies into our daily lives while out and about, on the move, and by offering the possibility of 'layer[ing] narrative and poetic experience on the world around us' (Rettberg 2019, 184). With this reference to layers, Rettberg clearly has in mind augmented reality applications which overlay the user's surroundings, as seen, for example, through the viewfinder of the device's camera, with digital content, such that the user can experience the work and their surroundings at the same time, as well as in relation to each other.⁹ Furthermore, although Rettberg is writing specifically about the implication of such developments for electronic literature, he also argues that computer games offer 'the most predominant form of storytelling in contemporary digital media' (Rettberg 2019, 116) and have provoked 'some of the most developed thinking about the potentialities of computation for

narrative, interactivity, and multimedia' (Rettberg 2019, 87), as well as flagging their potential for 'modeling ethical choice and moral complicity' (Rettberg 2019, 102). And it is the vast potential of computer games to not only tell stories but to implicate us directly in them that I want to address in what follows.

Before continuing any further, however, it is worth teasing out some of the basics of computer or video gaming terminology (these two terms tend to be used interchangeably) as a way of identifying what kind of a game *Sin Sol* is. Computer games have many different variables that affect everything about the way they are played. They can be designed to be played alone (single-player) or with others (multi-player), online or offline, on fixed devices such as PCs and TV sets, on movable gaming consoles or on mobile devices such as smartphones. *Sin Sol* is a single-player, offline game designed to be played on a mobile device. Computer games rely on a wide range of different software programmes and other technologies depending on the kind of platform they are designed for. Most seek to 'immerse' the player in a virtual environment (virtual reality) for sustained periods of time, although those designed for mobile devices may be designed for more 'casual' play and may also seek to 'augment' the player's real environment with digital content, as described above (Keogh 2014; Richardson and Hjorth 2014). *Sin Sol* is a mobile AR game that is arguably 'casual' in this sense.¹⁰ Most games are designed for entertainment — they are typically highly competitive, and there are a range of very popular genres such as the 'first-person-shooter' —, but there is also a branch of 'serious' or 'persuasive' games that seeks to educate or influence the behaviour of players beyond the game. And while 'AAA' ('triple A') games are blockbuster entertainment games that tend to require huge amounts of time and money to make and are thus developed by massive media corporations, there is also a thriving independent games scene, where gaming touches interactive digital art and electronic literature and there emerges the 'art game'. Again, this is where *Sin Sol* fits in — it is a form of 'serious' game and cárdenas promotes it specifically as an 'art game' on the App Store (cárdenas et al. 2020b).

The term 'art game' was coined in 2003 by Tiffany Holmes (Holmes 2003). Such games tend to either appropriate the most popular genres of computer gaming for sociopolitical critique or they eschew the mainstream, highly competitive game genres and encourage the player to appreciate them on aesthetic terms, to experience them as art. They focus on generating feelings, affect, and possibly also on moving the player to action beyond the game space (Castaño Díaz and Tungtjitcharoen 2015).¹¹ Within this field we find genres such as the 'walking simulator'¹² or 'environmental narrative' game which are typically virtual reality adventure games played on fixed devices that hinge on exploring the game space (ie. environment), possibly discovering and/or collecting things, but not engaging in mortal combat or other competitive practices (Mackey 2015). This kind of game is often more narrative-driven, hence coming closer to interactive fiction, as the player has to piece together fragments of information to make sense of the situation and progress through the game. It should also be noted that the topic of a game need not be environmentalist for a game to be an 'environmental narrative'. While these terms fit *Sin Sol* very well, clearly the mobile, AR nature of the game alters the equation of the 'walking simulator' somewhat since walking around is not just simulated but real. This is thus a mobile 'walking simulator' game in AR and an 'environmental narrative' that is also environmentalist in nature.

While the 'environmental' nature of computer games suggests itself as highly suited to environmentalist topics, 'green games' constitute very much a minor genre in the field. But before moving on to look at these 'green games', especially mobile ones, it is also necessary to explore briefly some of the key terminology associated with augmented reality as it pertains to its ability to impact our sense of self, our feelings and our subsequent behaviour. AR sits on a spectrum of environments in which we may find ourselves that stretches from the fully real to the fully virtual, or virtual reality (VR). While AR sits closest to real environments, mixed reality (MR) spans a range of positions in the middle of the spectrum, embracing AR and is often used as a synonymous term (Wagner *et al.* 2009, 250).

Much debate has related to the use of the term 'immersive' in relation to VR to refer to the all-encompassing nature of the sensory experience afforded to the user through the technology. Despite this particular application, it sits awkwardly with more common-sense understandings of the term which indicate that we can be just as immersed in a book or in our own thoughts as we can in any virtual environment where, in any case, we still retain contact with the real world through hand-held devices and other bodily senses.¹³ We might, for example, be distracted by the smell of toast burning while playing our favourite 'AAA' immersive MMORPG (Massively Multiplayer Online Role-Playing Game). It is for this reason that many scholars have moved on to speak in terms of the degree or nature of the user's sense of 'embodiment' in a VR environment (the range of sensory stimuli used and how the user is able to interact with that environment and the things in it) and hence of their sense of 'presence', of actually being there (Ahn and Bailenson 2011). Sun Joo Ahn and Jeremy Bailenson have furthermore argued that multisensory 'embodied experiences' in VR environments have a 'significantly greater' impact on pro-environmental inclinations and resultant behaviour than purely text-based mental stimulation, evidencing this through specific experiments to measure the pro-environmental impacts of different media (Ahn and Bailenson 2011, 1).¹⁴

But what about one's sense of embodiment and presence in hybrid real/virtual environments and the potential of these for impact on pro-environmental behaviour? AR, in conjunction with the mobile devices on which it is typically used, arguably pushes us further away from discussions of immersion and nuances discussions of embodiment and presence. A user's sense of embodiment in a game is complicated by engagement with their real environment and their sense of presence may shift back and forth between real and virtual levels or straddle both at the same time. Their perception of their real environment may be (helpfully) 'defamiliarised' and thus seen afresh through the lens of the virtual environment and/or accorded a more dynamic role in the work itself (Richardson and Hjorth 2014, 261), yet they may also need to keep an eye on very familiar elements of their real environment for their own safety. The research of Ina Wagner *et al.* into the impact of MR/AR underscores the significant impact on presence that the real environment can have, 'not[ing] the importance of impressions, such as wind blowing, cars or people passing, and leaves moving' (2009, 271) on users of one particular AR application. Olfactory and haptic stimuli can also have an impact here, dislodging the absolute hegemony of the visual and the auditory. For these reasons, researchers of MR/AR have typically preferred to discuss a user's (complex) sense of 'place' and 'placeness' – their sense of the properties of particular kinds of places, such as graveyards or museums — rather than immersion/presence as understood within computer studies

frameworks (MacIntyre et al. 2004, 36). Furthermore, Jay David Bolter and colleagues have also sought to make this kind of approach more sophisticated by discussing the importance of the affective or ‘auratic’ qualities of the places that AR works may seek to enhance (Bolter et al. 2006).

Bolter and colleagues challenge Walter Benjamin’s view that ‘aura’ – the unique nature of ‘Art’ – is something that the work of art loses ‘in the age of its technological reproducibility’ because it is no longer unique, set apart. They also conclude that there is no real logic to arguing that VR cannot have aura because it is all mechanically reproducible, all simulacrum, and that AR can achieve aura because it dialogues with the real and thus draws on the aura of non-digital objects and places. Indeed, they argue that, since Benjamin, in the key definition of aura in ‘The Work of Art in the Age of Its Technological Reproducibility’ (1935; see epigraph 2), looks to unmediated nature itself to ‘breathe in’ aura, ‘transparency’ of medium might be a criterion, and that VR might thus have this more readily in abundance than the more (hyper)mediated nature of AR (Bolter et al. 2006, 33). But of course, as they conclude, the reality is that any artist working creatively with any medium can predispose us to perceive it as more or less ‘auratic’ (Bolter et al. 2006, 36). Aura is not absolutely inherent to certain objects or places, nor is it a property restricted to certain non-reproducible technologies, nor is it dependent on lack of mediation — indeed, I would argue that Benjamin’s initial description of the aura of nature is not unmediated, but framed by the eye and the beholder’s understanding of what may be considered ‘picturesque’, and that a heightened, attentive, ‘auratic’ gaze automatically ‘frames’ the object of its attentions. Instead aura is a perceived quality of an object or place, an affective response that is contingent on relationality – ‘Aura is a relationship between a person and the place or object’ (MacIntyre, Bolter and Gandy 2004, 42) – and can thus be at least as much personal as it is sociocultural.

Bolter and colleagues are predominantly concerned with applications of AR in conjunction with locative technologies to enhance our appreciation of specific sites and landmarks. They thus discuss the ways in which AR can be deployed to enhance, or even create, the aura of such a place, drawing predominantly on shared sociocultural understandings of their importance or meaning. Where AR is used without locative but with space/motion-sensitive technologies to explore non-specified, everyday spaces, I posit that the overriding sociocultural aura of a recognisable landmark is no longer the axis on which emotional engagement turns and instead it will be the often more personal, affective response triggered by the combination of digital and real materials that are in dialogue at any one time. Aura is not entirely pre-programmable but very much more contingent on the user’s specific environment and this is where environmentalist applications suggest themselves.

A Scenographic Methodology for Analysing Aura in AR Applications

Given all the conflicting analyses about the nature of the ‘immersive’ and/or ‘embodied’ technologies discussed above, Lucy Thornett proposes a ‘scenographic’ approach as a more appropriate way of exploring how such technologies might affect the relationship of the user to their real and/or virtual environment and the level of affect this may generate. Thornett argues that a scenographic approach might ‘foreground the porous boundaries between different orders of world, and between bodies and worlds’ instead of

'focus[ing] on presence or immersion', 'forgo a fixation on narrative and realism in favour of a consideration of spatiality, materiality and embodiment', and that these shifts in emphasis might offer a means to focus on these technologies' 'potential to generate affective experiences' (Thornett 2020, 102–103).

When she discusses scenographically her own experience of various different AR and VR installations, Thornett is mindful of the kinds of 'expanded' spaces the works make, how she is able to move around and relate to them, and her own embodied, sensual and affective experience of them. She notices, for example, the 'potential to generate novel bodily experiences' to be found in 'the disjunctures of layered experiences of physical and virtual environments', and even flags the 'glitches' and 'flickers [...] of digital materialities as contributing to their affectivity' (Thornett 2020, 104; 111). This is notable since industry logic regarding the design of VR environments tends to associate seamlessness of design and high-quality graphics with successful 'immersion'. Glitchy, lo-fi experiences are, however, very much more a feature of art games. It is also noteworthy that two of the most significant installations that Thornett explores via this scenographic methodology focus on environmentalist concerns, one more utopianist, the other more bleak (114). It is clear that this kind of technology really lends itself to trying to address the urgent need for behavioural change in respect of climate crisis through its ability to 'move' viewers/players, to provoke affective, 'auratic' responses. And finally, since Walter Benjamin also saw the theatre as providing strong evidence of aura, a scenographic, theatrically-attuned approach would appear highly appropriate as a means of detecting the auratic potential of this kind of work.

All of these elements suggest that a scenographic approach of the kind proposed by Thornett will be appropriate for an AR environmentalist art game such as *Sin Sol*. Furthermore, Thornett is clear that she is not attempting to write any kind of authoritative guide to the works — a 'walkthrough' in computer gaming terminology —, but a partial, provisional, personal appreciation. With interactive works, the player's perspective is always partial, provisional and personal and to claim otherwise would be foolhardy. My discussion of *Sin Sol* is focused merely on my own response to the work as I played it in multiple sites across West and North Yorkshire over a period of around five months from Spring to Autumn 2021, alongside discussions of the game that I had with colleagues and some of my students at the University of Leeds. The claims that I make for what the game achieves are therefore quite cautious.

Green Games

Before moving on to examine my experience of playing *Sin Sol*, I want briefly to contextualise it in the emergent field of 'green games'. Much has been made of the inherently 'environmental' nature of computer games, as noted previously. Phillip Penix-Tadsen, for example, argues that 'Video game space must be considered in terms of interactivity, responsiveness, and function above and beyond its relationship to traditions of spatial representation in film and the visual arts', and that 'Rather than space in isolation or as the setting for the narration of events, video game space is an environmental context for the active creation of culturally contextualized meaning' (Penix-Tadsen 2016, 178). Alenda Chang argues, however, that while the design of game environments 'continue[s] to grow more computationally and graphically complex', they all too 'often

rest on relatively simplistic environmental models' such as resource extraction or visual spectacle (Chang 2019, 6). Nonetheless, Lauren Woolbright and Thaianie Oliveira argue that 'all games have the potential to generate ecological themes, creating dynamic interactive player experiences involving environmental arguments and ethics', and that 'Though few games are doing this overtly and as yet few game scholars are calling for it, the possibilities are very promising' (Woolbright and Oliveira 2016, 209).¹⁵

While the most recent edition of the *Encyclopedia of Video Games* accords very little space indeed to its entry on 'Environmentalism', devoting most of that to discussing the energy consumption of the practice, it nonetheless identifies a growing trend of casual, serious and experimental games devoted to promoting environmentalist awareness and possibly behaviour change, and an annual conference that is building a community of environmentalist game designers, players and critics (Wolf 2021, 302). Furthermore, although the market for 'AAA' games is still very much more interested in entertainment than education, Elizabeth Swanstrom has researched in some detail this trend of 'making use of games to promote social awareness, aid in conservation, and democratize activism' (Swanstrom 2016, 116), analysing examples of serious games with environmentalist themes circulating in the anglophone world such as *(Lil) Green Patch* (2008–2010) and *World of Greencraft* (2008) and Alenda Chang's *Playing Nature: Ecology in Video Games* (2019) also analyses environmentalist art/serious games such as *Flower* (2009) and *Black Cloud* (2008). In a Latin/x American context, Woolbright and Oliveira's 'Where the Wild Games Are' (2016) focuses attention on *Zona Incerta* (2007) a Brazilian alternate reality game about the fate of the Amazon rainforest, and Mexican artist/writer Eugenio Tisselli's retro survival game *The Gate* (2017) challenges the player to learn non-human languages to escape an overheating forest (Pereira 2020).

The growing prominence of mobile games that use AR in conjunction with either geolocation or movement-/space-sensitive technologies and their ability to combine real and virtual environments suggests interesting new possibilities for environmentalist games. The significant recent increase in recognition among the general public of the importance of addressing the climate crisis might also help such games to find receptive audiences. While, thus far, ecocritical readings have been made of the block-buster AR, locative game *Pokémon GO!* (Chang 2019, 61–64), the game in itself is not environmentalist in focus. It is thus the case that micha cárdenas and team's *Sin Sol/No Sun* (2018–2020) represents a really novel proposition in this 'field'.

cárdenas is known both for her activist work in conjunction with the Electronic Disturbance Theater 2.0/b.a.n.g. lab¹⁶ such as the development of the *Transborder Immigrant Tool* (2007–2012) – a GPS-enabled mobile phone app to help illegal immigrants cross the Mexico-USA border with a map providing up-to-date information regarding water sources, alongside eco-poetry about survival in the desert –, as well as for her solo and collaborative bioart performances and digital media projects, most of which explore questions of transitioning and trans identity, particularly as it intersects with questions of race and ethnicity. While there is clearly an environmentalist dimension to the *Transborder Immigrant Tool*, a previous online game/interactive narrative work that cárdenas designed using Scalar e-publishing software was entitled *Redshift and Portalmetal* (2014) and encouraged the reader/player to identify with the main character, a trans Latina woman, as she travelled into space to escape a dying planet, and interwove questions of environmentalism with social justice and the impacts of settler-colonialism. *Sin Sol* is

very much a follow-up to this earlier work, taking advantage of the opportunities offered by embodied technologies to address a similar scenario.

Sin Sol/No Sun: A Scenographic Approach

In this section I want to reflect on my own experience of playing *Sin Sol*, in order to address the following questions: How does the game work in scenographic terms? How does this allow us to better understand the meaning-making processes of the game? More specifically, what are the dynamics of the relationship between game environment and real environment? Where does aura come into the equation and what difference does any of this make? I will first consider my experience of embodiment and performance while playing the game. I will then move on to a consideration of the role of Aura2019 in the work and how she may be seen to enhance the auratic experience of my every-day environment. And finally I will explore the potential of the game's use of mobile but non-locative technologies for a more creative approach to aura, where the player can explore different kinds of auratic experiences.

This is Not a Walkthrough in the Park: Embodiment and Performance in Game Play

... and so, with a certain amount of hesitation, I head out to the park beside my house to carry on playing the game ... That hesitation is important to think through. I know that I need open space, but I also need safe space, particularly if I'm not going to be paying full attention to what's going on around me while playing; a space without major topographical hazards such as cliffs, dense woods or undergrowth, or roads of any sort, but also, since this is a single-player game, I need a safe space to play as a woman alone. The park beside my house fits the bill for my first, heuristic walk through the game. While it might have stinging nettles, dog poo and the occasional, potentially aggressive dog, it is otherwise flat and open. Being the North of England, it is, more often than not, 'sin sol' which makes reading the texts easier, although, as one of my students discovered, putting a finger over the camera lens also blocks out the sun, incidentally producing captivating dystopian red and orange backgrounds that seem to echo the narrative around forest fires and climate emergency. (See [Figure 4](#)) I am aware that my White privilege and location in a largely middle-class neighbourhood of a Yorkshire market-town enhances my safety, and contrasts distinctly with one of the stated aims of the game, which is to 'deeply consider how climate change disproportionately effects [sic.] immigrants, trans people and disabled people' (cárdenas et al. 2020a), and I think about this while playing.

There is no clear goal or way of winning, or even playing, the game that is made explicit to me. I intuit that I am supposed to try to piece together the fragments of narrative that hang by the side of the plants and that are performed by Aura2019 when I get close enough in virtual terms (which also means moving physically). As I move forward towards the first plant and then the second, others start to appear. I can approach any of the 2D or 3D objects in any order, from in front of them or from behind, and I can even walk through them. The game is aesthetically quite mixed, lo-fi and glitchy and certainly not aiming to suture itself seamlessly to my surroundings.¹⁷ I learn to appreciate these disjunctures, although I also tend to move the viewfinder so that the plants look like they're sitting nearly on the grass as much as possible. By my count, there are around twenty of these

However, I was not always self-conscious or distracted by others or by features of my environment. While I was never completely absorbed by the game to the point that I forgot where I was, I became adept at balancing and combining the game and my surroundings, of using it as a lens through which to view certain aspects of my environment more attentively, as much as I used my environment as a way to access the game narrative and to consider its implications. And importantly, I want to argue that the multisensory stimulation of playing the game outdoors, and the sense of both vulnerability because of lack of full attention to my surroundings, as well as enhanced engagement with aspects of those surroundings, predisposed me to receiving the game's message, to empathising both with its main protagonist and to turning an empathetic gaze on the world around me.

Finding Aura: Aura2019's Ability to Predispose Players to Experience Aura

Aura2019 self-describes as an 'errant navigational AI' hologram with a 'latinx girl body' ('Danced the connections . . .'). I learn that she is an avatar created by an 'original', human Aura who died some decades previous to the moment of our encounter and who created this avatar as a way of recording her memories of the end of human life on earth in the hope of finding future companions of any sort with whom she might share them. Indeed, Aura2019 presents a direct challenge to Friedrich Kittler's downbeat and very posthuman assessment of the chances of contemporary human beings engaging with their environments without mediation where he argues that,

What remains of people is what media can store and communicate. What counts are not the messages or the content with which they equip so-called souls for the direction of a technological era, but rather (and in strict accordance with McLuhan) their circuits, the very schematism of perceptibility. (1999, xli)

As I enter the game and approach the first plant, Aura 'breaks out of the loop [she's] been caught in' and starts to breathe again (see epigraph 1). Furthermore, in an inversion of typical 'walking simulator' game play which sees players exploring an environment, looking for things, she also breaks free of the rules that govern computer games, and expresses her happiness to have found me. She thus signals the possibility of a new, revitalised relationship with the environment, and she is going to guide me towards it, both through the ecopoetics of her narrative and through the AR dynamics of the game.¹⁸

Aura2019, I contend, can help the player to find aura, even in places and objects where traditional art criticism tells us that it does not exist — they are not special or unique, nor set apart for specific contemplation: this is a 'common or garden' type of aura. If we go back to Benjamin's original definition, based as it was on observation of the environment and natural elements therein, Aura2019, as she appears in my viewfinder, provides a frame, a distance from things that are otherwise too near, too mundane, too everyday, for me to appreciate fully. She thus offers me a way of reading my environment that imbues it with aura, giving it the capacity to move me.

It is worth underscoring the fact that this is not a specifically aestheticising dynamic — Aura2019/aura does not make all elements of my environment suddenly beautiful, though I may come to appreciate beauty in the shapes of the leaves of weeds. Rather, it corresponds to cárdenas's own theorisation of 'trans of color' 'poetic operations' (2022)

such as the ‘stitch’: the use of AR, with its palimpsestic layering of real and digital elements, gives a new twist to the operation of loosely ‘stitching’ things together, encouraging me to make connections between the game narrative and my own reality. My experience of *Aura2019/aura* is thus a relationship; it is about enhancing the level of my engagement with my surroundings such that I am provoked to consider more deeply the state of both my immediate environment and of the environment more generally. I may even start to reconsider the nature of weeds from a political perspective.

Choose Your Own Aura Games

The discussion of the perception of aura above is based on an heuristic first experience (or set of experiences) of the game in the nearest suitable outdoor space I could find. But, of course, with an AR game that is not dependent on geolocation, I can play it in any environment that I choose, and, after playing it once, there is a strong temptation to choose other environments that correlate with what I know of the game, to create my own hermeneutic, aesthetic and political engagement with both game and environment. In such cases, the temptation is to pick places with more socioculturally recognised aura of their own. It was for this reason, and because even the nearby park was too restricted a space to play the game comfortably, that I chose to continue playing the game up on Ilkley Moor, by the Twelve Apostles stone circle, on an evening not long after the Summer solstice. (See [Figure 6](#)).

Standing stones quite clearly have a numinous quality that attracts a range of different people on the solstice itself — they are inherently auratic, and even without having thought everything through carefully at that stage, I had a gut desire to see them through *Aura2019*’s eyes. Yet the moor itself clearly had a numinous, auratic quality of its own which is what attracted stone-age people to create sites for ritual observation on it in the first place. Some would argue that it still has such a quality — this is what underpins the UK Poet Laureate, Simon Armitage’s, project to inscribe eco-poetry on slabs of York stone not far from the standing stones.¹⁹ However, what was most striking when I played *Sin Sol*



Figure 6. *Aura2019* at the Twelve Apostles, Ilkley Moor. Screenshot on iPhone, another cloudy day in late June 2021. ©Thea Pitman.



Figure 7. A plant and the 2D screen of the Pacific redwood forest overlaid on the heather of Ilkley Moor, late June 2021. Screenshot on iPhone ©Thea Pitman.

on the moor was the disjuncture between the socioculturally recognised auratic qualities of the place and the state that it is in at present, with vegetation kept to a minimum by grazing animals and controlled burning to make the moors suitable for raising and shooting grouse. In this context the 2D screen depicting what was originally a 3D image of Pacific redwood forests was really provocative. (See [Figure 7](#)) It was the forests that were missing from this place. Indeed, this is precisely the basis for environmentalist and journalist, George Monbiot's, argument for rewilding the uplands of Britain that he puts forth so pointedly in 'The Hills Are Dead', his submission to the House of Commons Environmental Audit Committee for the inquiry, 'The Future of the Natural Environment after the EU Referendum' ([2017](#)).



Figure 8. Blackberries and laurel, framed by the Pacific Redwood screen in *Sin Sol*. Screenshot on iPhone ©Thea Pitman.

I returned to the game one last time in early Autumn 2021, back in the park by my house, just when the brambles were laden with blackberries. (See [Figure 8](#)) This time rather than giving in to the pull of conventionally auratic places, I played the game in such a way that I deliberately sought to draw on my own personal auratic associations with ‘common or garden’ phenomena. When I look at blackberries I think not just of foraging and making jam but also of their complex relationship to the commons, or what’s left thereof, as set forth in Canadian poet and climate justice activist Stephen Collis’s 2008 essay ‘Of Blackberries and the Poetic Commons’. Collis argues that, since brambles, and other weeds, thrive in the gaps between developments, ‘The blackberry is capital’s other exposure — its shadow self — and its quiet though ready critic’, yet it is also ‘a by-product of capital’s speculative aims in the present and future’, since it also serves as a placeholder for further development (2014, 135). Nonetheless, he goes on to argue that ‘because the blackberry occupies the space of capital’s future investment, it has this relationship with the imaginary and the possible. It holds forth a possible world, and thus opens the door for the vision of other possible worlds’ (Collis 2014, 135). This aligns in my mind with Aura2019 who also makes me want to envision other possible worlds.

Conclusion: Grassroots Relational Aesthetics and Aura as Free Association

In his highly influential *Esthétique relationnelle* (1998) [*Relational Aesthetics* (2002)], art critic and curator Nicolas Bourriaud reflects on the nature of aura with respect to the contemporary art of the 1990s. While, following Walter Benjamin’s arguments, he concedes that modern art has ‘mis à mal cet effet para-religieux’ [given this para-religious effect a hard time] (Bourriaud 1998, 64 [2002, 60]), he goes on to argue that ‘Partout, la sacralité fait son retour’ [Sacredness is making a comeback, here, there and everywhere], and that ‘on aspire confusément au retour de l’aura traditionnelle’ [In a muddled way, we are hoping for the return of the traditional aura] (64 [60]). Yet when he examines contemporary participatory and interactive artworks he finds that aura has shifted locus, moving ‘l’origine et l’effet [its origin and effect] (65 [61]):

De plus en plus, le public se voit d’emblée pris en compte. Comme si désormais, cette « unique apparition d’un lointain » qu’est l’aura artistique se voyait fournie par lui : comme si la micro-communauté qui se regroupe devant l’image devenait la source même de l’aura, le « lointain » apparaissant ponctuellement pour auréoler l’œuvre, qui lui délègue ses pouvoirs. L’aura de l’art ne se trouve plus dans l’arrière-monde représenté par l’œuvre, ni dans la forme elle-même, mais devant elle, au sein de la forme collective temporaire qu’elle produit en s’exposant.

[The public is being taken into account more and more. As if, henceforth, this ‘sole appearance of a distance’ represented by the artistic aura were provided by it: as if the micro-community gathering in front of the image was becoming the actual source of the aura, the ‘distance’ appearing specifically to create a halo around the work. The aura of art no longer lies in the hinter-world represented by the work, nor in form itself, but in front of it, within the temporary collective form that it produces by being put on show. (65 [61])

And, with the public rather than the artwork and its institutional framing now the source of the aura, he argues, quite simply, that ‘L’aura de l’art contemporain est une association libre’ [The aura of contemporary art is a free association] (65 [61]). It is freed from socio-cultural convention and made more personal — whatever you want it to be. Yet this is not

an argument for the kind individualism on which the mainstream art world thrives. The aura of free associations speaks also of our collective unconscious. The personal is thus also relational, communal; not in a way that can be appropriated and exploited by conservative and corporate interests, Bourriaud hopes — he notes that feminism, anti-racism and environmentalism are all movements that have been subject to co-optation by conservative institutions seeking to talk the talk while refusing structural change and thus retaining power (65 [61]) –, but in a more spontaneous, molecular, ‘grassroots’ kind of way.

While Bourriaud arguably exaggerates the potential for radicalism in contemporary artworks that nonetheless remain within the art system in which he operates, and while he undoubtedly did not have computer games, and still less the particular kind of game discussed in this article in mind when he was writing this — indeed, the concept of art games *per se* was not coined until several years after he published *Esthétique relationnelle* –, his appreciation of the nature of aura in contemporary art applies perhaps even better to a game such as *Sin Sol*, as I have shown above through scenographic analysis, than it did to the objects of his attention. *Sin Sol* contrives to restore the aura of the environment, of everyday nature, of which Benjamin wrote, through a design that is purposefully open to the player’s free associations. There is no guarantee that this will save the planet, of course — the most recent Intergovernmental Panel on Climate Change report (2022) makes for very grim reading — but if we can learn to see and, perhaps more importantly, feel aura all around us such that we become one with our environment, we become that aura, we may give ourselves a fighting chance.

Coda: Breathing in the Interstices of Life’s Activities

In 2006 veteran computer game designer and academic, Brenda Laurel, warned of the dangers of the rise of mobile games in a short piece entitled ‘Coda: Piercing the Spectacle’:

Who of us would choose simply to sit on a train or wait in a line when we could be distracting our brain and hands with a game? Idleness, slowness, contemplation, being mentally present in a situated context has no place in this wired world. But for those of us who were alive before this hyperactive culture grew up around us, it was during those interstices of life’s activities that we breathed, relaxed, observed, thought things over. (Laurel 2006, 868)

Yet Laurel retains hope for the fact that better games can be designed that can ‘powerfully reveal [...] to us a hidden or unsanctioned truth’ and ‘reconstruct notions of personal awareness, choice, and agency in ways that might seriously disturb the consumerist ethos that has been prepared for us’ (2006, 869). *Sin Sol*, I would contend, is one of these games; a game that allows us to keep breathing in more ways than one.

Notes

1. The game is set in 2077, according to the date given in the game itself (‘Danced the connections ...’), sixty years on from a report published in 2017 by the United Nations warning that life on Earth would have become unsustainable by that point if no changes to rein in climate change had been made (cárdenas et al. 2020b).

Nb. for references to specific passages from the game, I have identified individual fragments of narrative by the first words of their first line.

2. The game premiered in gallery spaces in 2018 and was released as an app in 2020 (see [cárdenas et al. 2020b](#)).
3. Nb. *cárdenas* writes her name without capitalisation.
4. The game itself credits *cárdenas* for game design, writing, direction and performance, Marcelo Viana Neto, Adrian Phillips for 3D modelling, Kara Stone for Unity development, Abraham Avnisan for environments, Wynne Greenwood and *cárdenas* for the soundtrack, Morgan Thomas for character design, Zia Puig and Clara Qin for research, Dorothy Santos for production, and Rachel Raymond and Robin Cruz for prototyping. (This list is a combination of that given in the credits in the game itself and that provided on the *Sin Sol* website [[cárdenas et al. 2020a](#)]).
5. Such arguments are, however, briefly sketched out for the reader in the following section.
6. See [Wolf-Monteiro \(2017\)](#) for a good overview of media coverage with respect to the topic of e-waste in particular.
7. Laura Marks wrote of her concern that ‘the information age is making us very good at symbolization, at the expense of bringing us into contact with that which we do not know and for which we have no categories. Surfing most websites or playing most video games confirms our ability to execute certain tasks, but I am not sure how it opens us to the unknown — except perhaps for those moments when, waiting for a download, we notice the shape of our fingernails for the first time’ (Marks 2002, xi-xii). Clearly she did not anticipate increased bandwidths nor mobile devices, and did not conceive of how her own theorisation of ‘haptic visuality’ might find a more dynamic iteration through such technological advances.
8. Locative technologies broker a specific relationship between the mobile device and its physical location: GPS (Global Positioning System) technology allows mobile devices to be tracked from afar and for them to draw in information about their location, while QR (Quick Response) and other, similar codes can also be scanned in physical locations to achieve similar outcomes, as we all well know from the QR-code renaissance during the COVID-19 pandemic. Other technologies such as LiDAR or accelerometers allow the mobile device to respond to its environment in relation to other objects in that space, gravity, speed, light, and so on, but not with respect to geographical location.
9. AR software may use geolocation to determine what digital content to display, or it may respond to markers placed on specific material objects that the user is pointing their device at, or it may overlay digital content on top of whatever the user is looking at, using sensors for a user’s movement, for example, to trigger changes in the programme.
10. Nb. Alternate reality games are not the same as augmented reality games. Alternate reality games, like fantasy fiction, seek to ‘immerse’ players, one way or another, in a ‘parallel universe’. They are usually transmedia creations that can, on occasion, genuinely convince players that the game is real.
11. See also [Sheller \(2014\)](#) for a useful parallel analysis of mobile art.
12. ‘Walking simulator’ is sometimes used in a derogatory way rather than as a neutral description of a genre.
13. Indeed, early on in the development of ecocriticism, Lawrence Buell voiced concerns that literature’s ‘immersive’ nature detracted from its environmentalist potential: ‘Writing and reading are acts usually performed indoors, unachievable without long shifts of attention away from the natural environment’ (Buell 1995, 84).
14. See also work by [Ahn et al. \(2016\)](#) looking at experiences of animal embodiment in VR environments and pro-environmental behaviour change.
15. Nb. An ecocritical interpretation can be made of any game, whatever its topic, mode of gameplay, setting or technological platform. Following [Woolbright and Oliveira](#), this line of enquiry can allow us to pose the following key questions: ‘How do ordinary and game worlds intersect, and what are their ecological repercussions? [...] how do their narrative and mechanical designs affect our environmental imaginations? What messages about environments might we carry from games into our ordinary worlds, and vice versa?’ (Woolbright and

- Oliveira 2016, 198). The branch of criticism devoted to exploring the intersection of computer gaming and ecology/environmentalism is still small but growing.
16. The EDT 2.0/b.a.n.g. lab is made up of digital media artists/poets/academics/activists micha cárdenas, Amy Sarah Carroll, Ricardo Domínguez, Elle Mehrmand, and Brett Stalbaum.
 17. This aspect of the game is also perhaps a deliberate expression of glitch (trans)feminism (cf. Sundén 2015).
 18. Other critics have articulated their strong personal response to *Sin Sol* and Aura2019's character with respect to gender politics more than to eco-poetics. Giulia Casalini, for example, writes that 'a trans woman of color opened up her soul to me, sharing her story of despair and resistance', and of the way the work provoked her to experience a feeling of 'femme solidarity' (Casalini 2021, 17), of care for the work's protagonist and for its lead creator.
 19. The 'Puddle Stone' poem is about half a mile from the Twelve Apostles (Stanza Stones Walk 2010).

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Notes on contributor

Thea Pitman is Professor of Latin American Studies in the School of Languages, Cultures and Societies at the University of Leeds. Her research generally focuses on Latin/x American digital cultural production, with a particular emphasis on questions of race, ethnicity and gender. In this field she has published *Latin American Cyberculture and Cyberliterature* (LUP, 2007) and *Latin American Identity in Online Cultural Production* (Routledge, 2013), both with Claire Taylor, as well as many journal articles. She has also published the monographs *Mexican Travel Writing* (Lang, 2009) and *Decolonising the Museum: The Curation of Indigenous Contemporary Art in Brazil* (Tamesis, 2021).

ORCID

Thea Pitman  <http://orcid.org/0000-0003-3436-1712>

References

- Ahn, Sun Joo, and Jeremy Bailenson. 2011. "Embodied Experiences in Immersive Virtual Environments: Effects on Pro-Environmental Self-Efficacy and Behavior." Stanford University Virtual Human Interaction Lab, Technical Report, 1–33, <https://stanfordvr.com/mm/2011/VHIL-technical-report.pdf> (accessed 24 March 2022).
- Ahn, Sun Joo (Grace), Bostick, J., Ogle, E., Nowak, K.L., McGillicuddy, K.T. and , and Bailenson, J.N. 2016. "Experiencing Nature: Embodying Animals in Immersive Virtual Environments Increases Inclusion of Nature in Self and Involvement with Nature." *Journal of Computer-Mediated Communication* 21(6):399–419. [10.1111/jcc4.12173](https://doi.org/10.1111/jcc4.12173).
- Benjamin, Walter. 2008. *The Work of Art in the Age of Its Technological Reproducibility, and Other Writings on Media*. edited by, Edmund Jephcott, Rodney Livingstone, and Howard Eiland, et al. Michael W. Jennings, Brigid Doherty, and Thomas Y. Levin (Cambridge, MA: The Belknap Press of Harvard University Press). [First published: 1935].
- Bladow, Kyle, and Jennifer Ladino, eds. 2018. *Affective Ecocriticism: Emotion, Embodiment, Environment*. Lincoln: University of Nebraska Press.
- Bolter, Jay David, Blair MacIntyre, Maribeth Gandy, and Petra Schweitzer. 2006. "New Media and the Permanent Crisis of Aura." *Convergence: The International Journal of Research into New Media Technologies* 12 (1): 21–39. doi:[10.1177/1354856506061550](https://doi.org/10.1177/1354856506061550).
- Bourriaud, Nicolas. 1998. *Esthétique relationnelle* (Dijon: Les presses du reel); trans. Simon Pleasance and Fronza Woods. (2002). *Relational Aesthetics* (Dijon: Les presses du reel).
- Buell, Lawrence. 1995. *The Environmental Imagination: Thoreau, Nature Writing, and the Formation of American Culture*. Cambridge, MA: The Belknap Press of Harvard University Press.
- cárdenas, micha. 2014. *Redshift and Portalmetal*, online game in Scalar, Accessed 15 February 2022. <http://scalar.usc.edu/works/redshift-and-portalmetal/index>.
- . 2020. "Sin Sol & Oceanic." Conference presentation, Queerness and Games Conference, December 12. Accessed 15 February 2022. <https://www.youtube.com/watch?v=rmdmA0yOAbc>.
- . 2022. *Poetic Operations: Trans of Color Art in Digital Media*. Durham, NC: Duke University Press.
- cárdenas, micha, et al. 2020a. "Sin Sol." *webpage*, Accessed 15 February 2022. <http://www.sinsol.co>
- . 2020b. "Sin Sol / No Sun." *iOS game app*. Accessed 15 February 2022. <https://apps.apple.com/gb/app/sin-sol/id1516054592>.
- Casalini, Giulia. 2021. "Trans Ecologies of Resistance in Digital (After)lives: micha cárdenas' *Sin Sol/No Sun*." *Media-N: The Journal of the New Media Caucus* 17 (2): 8–26. (accessed 15 February 2022. <https://iopn.library.illinois.edu/journals/median/article/view/769/716>.
- Castañó Díaz, Carlos Mauricio, and Worawach Tungtjitcharoen. 2015. "Art Video Games: Ritual Communication of Feelings in the Digital Era." *Games and Culture* 10 (1): 3–34. doi:[10.1177/1555412014557543](https://doi.org/10.1177/1555412014557543).
- Chang, Alenda. 2019. *Playing Nature: Ecology in Video Games*. Minneapolis: University of Minnesota Press.
- Collis, Stephen. 2014. *The Commons*. 2nd edn ed. Vancouver: Talonbooks. First published 2008.
- Electronic Disturbance Theater 2.0/b.a.n.g. lab (Micha Cárdenas, Amy Sarah Carroll, Ricardo Domínguez, Elle Mehrmand, and Brett Stalbaum). 2007–2012. *Transborder Immigrant Tool*. <https://collection.eliterature.org/3/work.html?work=transborder-immigrant-tool>.
- Holmes, Tiffany. 2003. "Arcade Classics Span Art? Current Trends in the Art Game Genre." Proceedings of Melbourne Digital Arts and Culture (DAC) Conference, 46–52, <https://web.archive.org/web/20030913141305/http://hypertext.rmit.edu.au/dac/papers/Holmes.pdf> (accessed 4 April 2022).
- Intergovernmental Panel on Climate Change. 2022. "Climate Change 2022: Mitigation of Climate Change, Sixth Assessment Report: Mitigation of Climate Change." April 2022, https://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_FinalDraft_FullReport.pdf (accessed 6 April 2022).
- Jackson, Tom. 2020. "'I've Never Told Anybody That Before': The Virtual Archive and Collaborative Spaces of Knowledge Production." In *Communities, Archives and New Collaborative Practices*, edited by Simon Popple, Andrew Prescott, and Daniel Mutibwa, 93–108. Bristol: Polity Press.

- Keogh, Brendan. 2014. "Paying Attention to *Angry Birds*: Rearticulating Hybrid Worlds and Embodied Paly Throug Casual iPhone Games." In *The Routledge Companion to Mobile Media*, edited by GerardGoggin and Larissa Hjorth, 267–275. New York: Routledge.
- Kittler, Friedrick. 1999. *Gramophone, Film, Typewriter*. edited by Geoffrey Winthrop-Young and Michael Wutz. Stanford: Stanford University Press. First published 1986.
- Laurel, Brenda. 2006. 'Coda: Piercing the Spectacle', in *The Games Design Reader: A Rules of Play Anthology*, edited by KatieSalen and Eric Zimmerman, 866–869. Cambridge, MA: MIT Press.
- MacIntyre, Blair, Jay David Bolter, and Maribeth Gandy. 2004. "Presence and the Aura of Meaningful Places." Proceedings of the 7th Annual International Workshop on Presence (Presence 2004), 36–43, <http://www.yorku.ca/caitlin/futurecinemas/resources/coursepack/aura.pdf> (accessed 27 March 2022).
- Mackey, Bob. 2015. "The Gateway Guide to Walking Simulators." *US Gamer*, 22 July 2015, <https://www.usgamer.net/articles/the-gateway-guide-to-walking-simulators> (accessed 4 April 2022).
- Marks, Laura U. 2002. *Touch: Sensuous Theory and Multisensory Media*. Minneapolis: University of Minnesota Press.
- McKibben, Bill. 1992. *The Age of Missing Information*. New York: Random House.
- McMurray, Andrew. 2014. "Media Moralia: Reflections on Damaged Environments and Digital Life." In *The Oxford Handbook of Ecocriticism*, edited by GregGarrard, 1–16. Oxford: Oxford University Press. doi:10.1093/oxfordhb/9780199742929.013.025.
- Monbiot, George. 2017. "The Hills are Dead", Submission to the House of Commons Environmental Audit Committee Inquiry 'The Future of the Natural Environment After the EU Referendum.' 4 January 2017, <https://www.monbiot.com/2017/01/04/the-hills-are-dead> (accessed 12 April 2022).
- Penix-Tadsen, Phillip. 2016. *Cultural Code: Video Games and Latin America*. Cambridge, MA: MIT Press.
- Pereira, Paulo Silva. 2020. "Greening the Digital Muse: An Ecocritical Examination of Contemporary Digital Art and Literature." *Electronic Book Review*. doi:10/7273/v30n-1a73. 3 May 2020.
- Rettberg, Scott. 2019. *Electronic Literature*. Cambridge: Polity.
- Richardson, Ingrid, and Larissa Hjorth. 2014. "Mobile Games: From *Tetris* to *Foursquare*." In *The Routledge Companion to Mobile Media*, edited by Gerard Goggin and Larissa Hjorth, 256–266. New York: Routledge.
- Sheller, Mimi. 2014. "Mobile Art: Out of Your Pocket." In *The Routledge Companion to Mobile Media*, edited by Gerard Goggin and Larissa Hjorth, 197–205. New York: Routledge.
- Stanza Stones Walk. 2010. "Website." <http://www.stanzastones.co.uk> (accessed 12 April 2022).
- Sundén, Jenny. 2015. "On Trans-, Glitch, and Gender as Machinery of Failure." *First Monday* 20: 4. doi:10.5210/fm.v20i4.5895.
- Swanstrom, Elizabeth. 2016. *Animal, Vegetable, Digital: Experiments in New Media Aesthetics and Environmental Poetics*. Tuscaloosa: University of Alabama Press.
- Thornett, Lucy. 2020. "The Scenographic Potential of Immersive Technologies: Virtual and Augmented Reality at the Prague Quadrennial 2019." *Theatre and Performance Design* 6 (1–2): 102–116. doi:10.1080/23322551.2020.1785178.
- Wagner, Ina, W. Broll, G. Jacucci, K. Kuutii, R. McCall, A. Morrison, D. Schmalstieg, and J-J. Terrin. 2009. "On the Role of Presence in Mixed Reality." *Presence Teleoperators and Virtual Environments* 18 (4): 249–276. doi:10.1162/pres.18.4.249.
- Wolf, Mark J. P. 2021. "Environmentalism." In *Encyclopedia of Video Games: The Culture, Technology, and Art of Gaming*, edited by Mark P. J. Wolf, 301–302. 2nd ed. Santa Barbara, CA: ABC-Clio.
- Wolf-Monteiro, Brenna. 2017. "Consuming Justice: Exploring Tensions between Environmental Justice and Technology Consumption through Media Coverage of Electronic Waste, 2002–2013." unpublished doctoral thesis, University of Oregon, <https://scholarsbank.uoregon.edu/xmlui/handle/1794/22618?show=full> (accessed 13 April 2022).
- Woolbright, Lauren, and Thaiane Oliveira. 2016. "Where the Wild Games Are: Ecologies in Latin American Video Games." In *Ecomedia: Key Issues*, edited by Stephen Rust, Salma Monani, and Sean Cubitt, 196–212. London: Routledge.