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Abstract

Videogames invite players to inhabit virtual worlds that often represent or simulate ecologies. Existing conceptual frameworks for understanding these dynamics and experiences as they arise from play emphasise the role of the videogame text in structuring such meaning. This article introduces the concept of *emergent ecological dynamics* to explain how, within the situated and ephemeral experience of playing a videogame, new ecocritical meaning can emerge, and can be captured in user-created paratexts. Undertheorised in ecocritical game studies are player experiences of ecologies and environments that emerge in ways unanticipated and unintended by gamemakers. By drawing on explanations of assemblage, emergence, and the materiality of digital media, this article suggests a latent potential for all videogame texts to convey ecocriticality. The methodological value of addressing player paratexts—as a means for scholars to access and analyse otherwise transitory emergent ecological dynamics—is also explored. The capacity of such user-created artefacts to manifest players' revelations of ecological entanglement, development of ecological awareness and encounters with potent sensations of affect drawn upon as examples.

Keywords

Ecocriticism; videogame ecologies; player paratexts; emergence; assemblage

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When we play videogames, we often enter into relations with some form of a virtualised ecology. Whether the game we play is characterised by high-fidelity graphics and powerful simulation models that represent the cutting edge of computer processing power or, instead, utilises more modest modes of representation and interaction, our play occurs within virtual *worlds*. Videogames summon into being virtual worlds comprised of various types of natural environments, populated with humans, animals and other creatures, and bearing ecological dynamics that dictate how players, in-game entities and virtual natural systems interact with one another. This will be uncontroversial for most people who have booted up a videogame and

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encountered landscapes, climates, creatures and more. Less obvious is the fact that while fictional (in the sense that videogame worlds are media objects designed, coded and scripted by game makers), these environments and ecological dynamics are often closely connected to conditions on Earth.

In the field of game studies, attention to ecological dynamics—through the intellectual practice of ecocriticism—is burgeoning. The present era is one in which humanity's asymmetric relationship with planet Earth has led to intertwined and compounding ecological crises, including climate change, global warming, biodiversity collapse and toxic pollution. Scholarly attention has turned increasingly to the role of popular culture in representing ecologies, environments and in their ability to highlight these conditions of crisis (as well as their causes and possible mitigants) to everyday audiences. As I outline shortly, ecocritical efforts within game studies are largely captured by game-centric approaches founded on static textual analyses. Consequently, the ecocritical substance of the variable, situated and lived experiences of play are largely overlooked. By turning attention to the ecomaterialist possibilities opened up by thinking of games and play as assemblages, and the emergent nature of the play experiences that arise from assemblages, I outline the potential for recognising *emergent ecological dynamics* that come together during play and which are stabilised and shared online by players in the form of paratexts. My aim is to establish that emergent ecological dynamics are both a conceptual and methodological intervention in ecocritical game studies. The structure of this article reflects this duality of purpose: I first build the theoretical basis of this concept, before turning to consider relevant extant case studies that illustrate what player paratexts might reveal to us about players' everyday encounters with emergent ecologies in videogames.

The ecocriticality of videogames

Game studies scholars have sought to understand how virtual environments reflect their material earthly counterparts, as well as how the complex systems modelled by videogames might offer access to ecological pasts, presents and futures. Some scholars turn their attention to the possible outcomes of play, asking how both the representational and interactive elements of videogame texts might support players in developing their awareness of, and shifting their attitudes towards, ecological relations. These different modes of game studies ecocritical inquiry are often closely bound up with the conditions of what I will refer to in this article as the Anthropocene era.

Anthropocene is a term, originating in the work of atmospheric chemist Paul Crutzen and ecologist Eugene Stoermer (2000), to describe a geological epoch in which humankind has ascended to biospheric supremacy, and whose aggregate activity is responsible for shaping Earth's climate and environments. Intense debate sur-

rounds this epochal label, including whether the term draws our attention to scientific, cultural, political, or economic conditions. A key failing of the term is that in assigning planetary agency (and blame) to humankind, the idea of an 'Anthropocene' appears to universalise culpability. Unequal relations of geography, class, race, and gender are collapsed by the label's assumptions. Recognising that harm has been inflicted on our planet unevenly—by specific groups of humans, concentrated in particular parts of the world, and driven by the rapacious logics of capitalism and colonialism—is critical to understanding the origins and effects of today's ecological crises (Chakrabarty, 2017; Klein, 2014; Nixon, 2013). Jason Moore's (2016) term 'Capitalocene' has been one particularly influential intervention, seeking to situate our ecological crises within a critique of capitalism. Following the lead of Elaine Gan et al. (2017) I use the term as a kind of short-hand for our era, but one that does not accept the worst uses or assumptions of the label, instead aiming to enter a conversation around our present conditions "in dialogue with those who remind readers of unequal relations among humans, industrial ecologies, and human insignificance in the web of life" (2017, p. G3).

Against the backdrop of this era of planetary harm, the approaches adopted by many ecocritical game studies scholars have been compelling in asserting the position of digital games as important forms of ecomedia, whether such qualities are intentional or incidental. Alenda Chang (2019) draws on a variety of virtual environments to explore how their mesocosmic, multiscalar, non-human, entropic and precarious characteristics reveal the intertwining of real and imagined worlds through videogames. In an Anthropocene era in which humankind has "crept inexorably into all aspects of the world around us", Chang's analysis offers an important corollary: that the "world has also inevitably permeated into our technical artifacts, including games" (2019, p. 11), albeit through interactive models that are often reflect naive and one-dimensional accounts of nature. Benjamin Abraham and Darshana Jayemanne (2017) also establish the connection between physical and virtual worlds, suggesting that assumptions and models relating to human–environment relationships have always found their way into games. They suggest four key models for the figuration of environments in videogames: as backdrop (a relatively inert space), as resource (offered up for exploitation), as antagonist (resisting the player and their progress), and as text (where environment suggests or conveys narrative). Proposing these four models as a heuristic to help with analysis of the overlap between our real and imagined worlds, Abraham and Jayemanne observe that games engage with different aspects and combinations of these human-environmental modes at different times, with the player's experience of virtual nature shaped by a game's shifting emphasis on various ecological dynamics.

Extending the case that videogames produce arguments about the relationship between humans and nature, Melissa Bianchi (2014) foregrounds the role of gamemakers and, importantly, the material conditions surrounding game development. Bianchi argues that while the cultural context and the intentions of game designers undoubtedly play a significant role in the ideological framing of nature within

their texts, virtual representations of ecology are "inherently bound to and governed by material limitations (i.e., processing speed, memory, graphical capabilities, keyboard and mouse controls, etc)" that shape game design (2014, p. 210). Entangled with the cultural and technological dimensions of our own world, videogames have the power to communicate both the opportunities and perils of human–environmental relations because of their capacity to connect player attitudes and actions to outcomes in rule-based simulatory systems (Backe, 2017), as well as through the imaginative appeal of aesthetics and visual representation (Abraham, 2018a) and their capacity to model futures (op de Beke, 2021). Scholars have sought to illustrate a diverse array of ecological dynamics in videogames through close analysis. Examples include the industrial capitalistic impulses underlying survival crafting games (Abraham, 2018b), the way that the environmental god game genre juxtaposes apparent ecological relationality with an inexorable impetus for expansionism and progress (op de Beke, 2020) or the oscillation between anthropocentric mastery and natural wonder in the *theHunter* series (Felczak, 2020). Other work emblematic of ecocritical game studies considers the way that plants and gardens in virtual postapocalyptic worlds can structure player engagements with ideas of the posthuman (Bianchi, 2024) and the particular temporal logics at work in oil-themed games (op de Beke, 2024).

What unites the analytical approaches I have outlined is an emphasis on the ecocritical potential of the videogame object itself. It is the game, or specific aspects of its design, that represents and simulates nature, and it is the game that invites and affords the player's interaction with ecologies. As such, according to the ecocritical models dominating game studies, the ecological dynamics encountered in play are a product of games and often (but not always) the intentions of those who make those games. To be clear, these game-centric approaches to understanding virtual ecologies are valuable, and I have no desire to diminish their contribution to ecocritical game studies. However, through a common emphasis on the ecocriticality of the videogame text, and the text's possible impact upon the player, the act of *play* and its contribution to meaning-making appears overlooked. In response to this gap, I seek to re-orient focus toward the *emergent* ecological dynamics, relations and meanings that develop amidst the unpredictability and contingency of moments of play.

The ecocriticality of play

I join a handful of scholars who have recently de-emphasised *textual* content in order to centre ecocritical analysis upon the various elements of videogame production and play. Benjamin Nicoll (2023), for example, shifts focus to the player's subconscious in a Lacanian reading of play that suggests videogames can reveal the way we derive *jouissance*—unconscious enjoyment—from our own complicity in Earth's deteriorating ecological conditions. Paolo Ruffino (2020) asks us to consider what we might learn from the processes that arise when games are created and played

by non-human actors or processes. Alenda Chang (2024) considers the ecocritical potential of sustainability oriented online communities for game developers. Benjamin Abraham (2022) urges game scholars, makers and players alike to turn their attention to the material provenance and impact of games (in terms of dangerous resource extraction, voracious labour exploitation, toxic pollution and waste) and to decarbonise the industry as a matter of urgency. Developing Abraham's provocation further, Emil Hammar et al. (2023) call for games scholars to more accurately address the underlying conditions of imperialism, racism, militarism, fascism and patriarchy that drive a number of societal issues (including climate crisis).

In this article I outline an analytical approach that similarly destabilises the assumed centrality (to ecocritical enquiry) of the core videogame text and the determinations of its developers and development process. My approach is in many ways consonant with earlier theorizations of play and its potential in meaning-making. Consider, for example, Miguel Sicart's (2011) rejoinder to proceduralist approaches to game studies. Resisting (then-ascendant) tendencies to celebrate the apparent capacity of games to step players through ideological perspectives procedurally, and impress predetermined meanings upon their audiences, Sicart crucially insists that play is more than mere performance of a developer's intentions. Instead, the "player who wants to play" is situated centrally, because play "does not only include the logics of the game - it also includes the values of the player" (2011, p. np), their politics, their social being, and their body. Play is understood best not as procedural argumentation, but as an act of unpredictable player "expression, guided through rules, but still free, productive [and] creative" (Sicart, 2011, p. np). Meaning-making in play, in this now-influential account, is fundamentally configurative and open.

Melissa Bianchi (2019), meanwhile, develops a similar concept of play specifically oriented toward ecocritical analysis. Ecoplay, developed out of earlier rhetorical analytical perspectives, urges analysis how the experience of play shapes and formulates concepts of environment and ecologies for players. Bianchi emphasizes the multimodal qualities of games and the place of play within "broader rhetorical ecosystems" (Bianchi, 2019, p. 19), privileging the contributions to meaning-making made by players, players' values and experiences, and players' abilities to map connections between the game at hand and other mediated encounters with ecology or ecological messaging. As such, ecoplay offers insight into "the relations (or interplay) between gameplay and other rhetorical modes and media" and the ways these "elements inform and interact with one another" (Bianchi, 2019, p. 19). More recently Sicart (2022) similarly expands his explanations of emergent, player-driven meaning-making to incorporate the interrelationship between players and the countless other actors, entities and agencies that surround us. Sicart, like Bianchi, reminds us that the act of play should be understood as a "relational practice of being in the world, characterized by the creation, recreation, and appropriation of relations between agents and things and mediated by materialities" (2022, p. 143).

Together, Sicart and Bianchi's approaches help establish the value of analysing play experiences—rather than just games—ecocritically. They call attention, again, to the limitations of narrowly game-centric approaches to understanding the meaning-making associated with play. I follow this conceptual thread and turn instead to the contingent phenomena that emerge as part of everyday player experiences of gameplay and offer a play-centric and player-centric approach to the analysis of ecological dynamics. Such an approach, as I will go on to argue, offers a distinctive form of access to comprehend the materiality of videogames and their interconnection with other actors and entities, and can make legible players' own revelations of the assemblages of play. Guided, in part, by the limited scholarship available directly addressing player-created paratexts, I focus my attention on the potential for such artefacts to illustrate and manifest emergent ecocritical experiences characterised by revelations of *entanglement*, the development of *ecological awareness*, and the fostering of sensations of *affect*. This, of course, is not to say that there are not other interesting, rich and surprising types of emergent player experiences with ecocriticality. Rather, as I outline in the article's conclusion, ecocritical game studies researchers are presented with the exciting—and urgent—chance to further explicate players' situated encounters with ecologies and ecological meaning.

Locating the lived experiences of play

My argument that some capacity for ecocritical meaning of videogames is found in emergent ecological dynamics, which develop out of the ephemeral and transitory experiences of play rather than solely from the textual content of games, is grounded in two important phenomenological attributes of these media. Firstly, that videogames, their players and the contexts surrounding their production and play are best understood as a form of assemblage. Assemblage thinking encourages us to look beyond game texts themselves for the material, political, social and cultural meaning that might circulate through play. Secondly, I employ the concepts of emergence and emergent meaning which outline how games draw on their broader assemblages, as well as the inherent novelty and unpredictability of complex computing systems, to generate play experiences not anticipated or intended by game makers. With its foundations in assemblage and emergence, the concept of emergent ecological dynamics offers a way to think about the lived experience of playing with ecologies, and ecological meaning, in videogames.

Assemblage thinking is an important starting point for an understanding of emergent ecological dynamics. It is not a new claim to suggest that videogames—and in particular the complex relationship between videogames, their players, and the technologies that sustain them—should be considered assemblages (Keogh, 2018; Taylor, 2009) or an assemblage-like 'mangle' (Steinkuehler, 2006). As T.L. Taylor observes, defining and approaching a videogame narrowly as that which is found 'inside the box', so to speak, reveals "something about the given structure of the artifact or its imagined player" but precludes an understanding of the lived object that

it becomes once a user actually engages with it (2009, p. 332). Rather, a range of actors and practices inform and actively contribute to play experiences, including technological systems and software, the material world, genre expectations, gaming communities, players' inner lives, their cultural contexts, and institutional structures, and these must be acknowledged (2009, p. 332). Brendan Keogh (2018), in describing the 'embodied textuality' of digital gameplay, argues for a reflexive view of the player and the game system as co-constitutive. Playing a videogame is thus a "coming-together", not of "preexisting, separate, distinct subjects or objects", but "as a cybernetic assemblage of human body and non-human body across actual and virtual worlds" (Keogh, 2018, p. 34). Distributed across the various cognitive, material, cultural, social and political domains alluded to by Taylor, the assemblage of play is "a multiplicity, a spatiotemporally contingent and situated coming-together" of actors, signs and practices (Andiloro, 2023, p. 563) that is at once "intimate, unknowable, ironic, and monstrous" (Ruffino, 2020, p. 15). Play, in this view, is characterised by a dynamic of constant negotiations between the various human and non-human actors assembled (Chang, 2019, p. 20).

Thinking about videogames and game experiences as forms of assemblage for ecocriticism implies that our attention *must* be drawn beyond the boundaries of the game text. Assemblage offers an opportunity to locate and analyse constituent elements of virtual ecologies in more fluid and situated ways. It is a mode of thinking that highlights "the agency of the materials themselves as processes within assemblages" (McFarlane, 2011, p. 221), as well as particular tendencies and dispositions—either manifest as a potential, or an actual expression—of the various actors arranged within an assemblage (DeLanda, 2016, p. 108). The ambit of this distributed motivation and capacity for action includes the shaping of ecological dynamics within the play experience. While videogames, and their creators, certainly take centre-stage in the assemblages we might consider from an ecocritical perspective, they do not determine alone the nature of players' encounters with environments and ecologies. From an individual player's history and memories of interactions with different gameworlds, to the stories and images they might have encountered while scrolling through an online forum related to the game, to the material experience of their handling of their game console's physical hardware, and even to the influence of the weather outside the window, an array of actors beyond the game text have the potential to define virtual ecologies.

Examining videogame assemblages from an ecocritical perspective also invites particular consideration of the material inheritance and impact of digital play. The material components of the assemblages that make up digital media mean that "media cultural objects and information technology have an intimate connection with the soil, the air and nature as a concrete, temporal reality" (Hertz & Parikka, 2012, p. 429). While an "illusion of immateriality" (encouraged by the industries that produce and capitalise upon computing hardware) has long shaped discourse about and perceptions of digital media as "otherworldly and mystical" (Watson, 2021, p. 3), com-

puting devices, clouds, networks, software production and communication infrastructures all carry with them a profound material inheritance from our Earth. By pursuing what Jussi Parikka describes as the 'geology of media', we can begin to untangle the complex ways in which "digital culture starts in the depths and deep times of the planet" (2015, p. 58) and the ways in which our media and planetary resources are caught in a co-constitutive double-bind (Parikka, 2015, pp. 12–13). It is, of course, an asymmetric boundedness, where the industrial processes that underpin the production, distribution and connectivity of media and computing demand resource extraction, fabrication processes, the burning of fossil fuels, toxic pollution, labour exploitation and the endless accumulation of electronic waste (Abraham, 2022; Parikka, 2016; Watson, 2021).

David Beer observes that an assemblage approach allows us to open up complex entanglements of bodies, technologies and culture, and to "unravel a materially situated context to the analysis" of the various elements of these arrangements (2013, p. 36). The urgency of adopting such materially grounded analysis in videogames research is summarised by Thomas Apperley and Darshana Jayemanne (2012) in their overview of game studies' 'material turn'. The authors foreground the "stubbornness" of material realities to digital phenomena and media (2012, p. 7) and call for a "crucial re-imagining" that sites games firmly within their "material contexts across different scales and registers: the machine, the body and the situations of play" (2012, p. 5). Melissa Bianchi (2017) and Marco Caracciolo (2021), in ecocritical analyses, have each explored how videogames' narratives, aesthetics and mechanics can foster ecological awareness through nonhuman-oriented experiences that expose, in different ways, the layers of assemblage and entanglement surrounding players. By continuing to find ways to centre ecocritical analysis on the assemblages of play—including the material dimensions of these arrangements—we are not only able to trace the manifold ways in which videogame meaning and experience is shaped beyond the design of the core game text, but we can also trace how our planet's own ecological and geological resources come to reside within and influence play.

Out of the manifold assemblages that make up play emerge lived experiences for players. These experiences carry with them meaning, which while *centred* around the player's encounter with the representational and interactive content of a videogame text, does not always entirely or solely reflect what is contained within that central text. Thinking about the phenomenon of *emergence* helps to explain the dynamic and sometimes unpredictable meanings attached to players' lived experiences with videogames. Emergence is rooted in scientific thought at the end of the nineteenth century, and George Henry Lewes' (1891) writing on the topic establishes some of the phenomenon's key tenets. Lewes, observing organic systems found in nature, describes a "qualitative novelty" produced in some systems, where the material output of these systems is "unlike its components insofar as these are incommensurable, and it cannot be reduced to their sum or their difference" (1891, p. 369). Rather than the products of the natural systems in question being *resultant* (i.e.,

quantitatively predictable), Lewes observed them as *emergent* (i.e., novel and unanticipated). Emergence came to be paired with the analysis of complex systems, within which macro-level phenomena are dependent upon their underlying, intertwined processes, but are also autonomous from these micro-level interactions to the extent that, ultimately, "the global behaviour has no simple explanation" (Bedau, 2008, p. 160). Emergence, therefore, is a concept that explains the generative engine residing at the heart of complex systems. Rules, processes and actors combine in a system and unpredictable, novel and complex outcomes emerge.

Game studies is no stranger to theories of emergence. Katie Salen and Eric Zimmerman describe videogames as complex and emergent systems, and note that simply combining a game's rules together does not illustrate the experience of play (2003, pp. 163–164). Emergence is the "primordial structure" of the videogame according to Jesper Juul, who points out that the play of any text by an actual user yields countless potential experiential variations (2005, p. 73). In videogames, emergent narratives are encounters with story and meaning that "are not pre-structured or pre-programmed, taking shape through the game play" (Jenkins, 2004, p. 128), and which "come into being because of the systemic nature of videogames and their variable constituents" and the interactions between those constituent components (May, 2021, p. 21). Fuelled as they are by the complexity of the assemblages that make up play (which are, in effect, themselves systems), the experiences and meanings that arise out of videogames are emergent. Actors distributed across the material, social, political and cultural assemblages of games interact and exercise their agency in fluid and unpredictable ways. In concert with one another, theories of assemblage and of emergence provide, therefore, the ideal basis for thinking about how ecological meaning might develop during play.

Tracing emergent meaning

I have sought to establish that, out of the assemblages that comprise games and play, unanticipated and transient textual encounters emerge. In these emergent experiences we might find, among other things, expressions of ecologies and ecological relations. However, other than through our own scholarly play, how do we gain access to these ephemeral, transitory phenomena? As a method for tracing emergent ecological methods, I turn to player-created paratexts—game-related digital ephemera including discussion posts, gameplay videos, screenshots, fan art, stories and the like—as artefacts that capture, preserve and make encounters with emergent meaning legible to others. The concept of the 'paratext' is well established in literary studies, having been introduced by Gérard Genette (1997) to account for the elements of a publication that surround and shape a reader's approach to and interpretation of a core text (its cover, preface, illustrations, and so on). While Genette's own focus was limited to the printed book, the concept has found productive application across a wide range of media forms, including videogames (Gray, 2010).

While some scholars identify an ongoing tension between the apparent rigidity of Genette's original formulations and the embrace of 'paratext' within the studies of different media and cultural phenomena, I join those who pursue the generative potential of the broader application of the idea of 'paratext'. Such perspectives recognise that while we might address media forms different to those prized by Genette, such analyses "continue to function in the spirit of his analysis" (McCracken, 2013, p. 106) and, in overlooking narrow classificatory matters, a productive "treasure trove of questions in Genette's spirit" is opened up (Birke & Christ, 2013, p. 65). Game studies is particularly indebted to Mia Consalvo (2007) for the popularisation of the 'paratext' concept within the field, as her landmark work drew attention to both the industrial, officially sanctioned paratexts (including advertisements, game manuals and strategy guides) and those unofficial works created by users (in the forms of walkthroughs, reviews, message-board posts, and so on). In the context of digital games, paratexts not only *surround* a main text, but extend the textual presence of a game across countless other artefacts, shared in printed, audiovisual and digital forms between players, developers and critics. The varied arrangements of paratexts consumed by players combine to "provide challenges to sedimented meanings" found—or designed—within a game (Consalvo, 2007, p. 182), and actively "transform and condition how the audience interprets the main text" (Fernández-Vara, 2014, p. 25). Esther Wright (2022), writing about developer-created paratexts (but nonetheless making a point that is equally applicable to user-created paratexts), observes that analysing paratextual material is essential to comprehending the meaning-making and ideological work undertaken through games.

Crucially, for the concept of emergent ecological dynamics, paratexts also offer a means to retrace what Souvik Mukherjee calls the "ephemeral text" (2015, p. 103) or "'disappearing' game narrative" (2015, p. 104) that arises from play. This is the emergent experience of a game text I have already described; it is fleeting, it only exists as long as the player is engaged in the play sessions, and it can change dramatically each time the game is played. Paratexts in which players record or reflect on their experience of play can reveal the ephemerality of play. Players themselves capture the meaning of their particular assemblages of play through diverse artefacts, which include 'Let's Play' videos, after-action reports, screenshot, written stories and fan art (Mukherjee, 2015, p. 104). In efforts to reconstruct emergent play experiences (by players and scholars alike), the paratext "artefact becomes the key piece of evidence – the end result of an experience, or series of experiences, within a game text" (May, 2021, p. 7). Understood as artefacts that render emergent experiences visible and legible to others, paratexts have a powerful role to play in focusing our attention on the lived experiences of play. As Dan Golding has argued, videogame scholarship has frequently exhibited a desire "to regard the videogame as a whole … to stand above the videogame, outside of its grasp" and construct totalising and universalising accounts of games and the experiences of their play (2013, p. 30). This account recalls the text-centric emphasis I have noted as existing in extant ecocritical game studies research, and I therefore enthusiastically embrace Golding's call to move

away from the allure of finite, stable and isolatable notions of the textuality of videogames, and instead turn towards imperfect, incomplete and contingent expressions and impressions of play that reflect the direct and lived experiences of players.

Not only do paratexts capture the otherwise transient emergent experiences of story and meaning players have within games, but they also bear a particular affinity with assemblages. As Dorothee Birke and Birte Christ explain with respect to paratexts across a range of media, paratexts help to bring into view the historical, social, production and reception conditions that surround texts, raising questions about "how readings are circumscribed by factors that are usually seen as marginal (or even external) to the text" (2013, p. 66). Jan Švelch (2020) urges a shift away from the use of the term 'paratext' and the association of the concept with individual cultural artefacts that are perceived as ancillary to a 'core' text, and looking instead towards a quality of 'paratextuality' that texts might exhibit. This is in part because speaking of 'paratextuality' as a functional attribute emphasises the "link between a text and the surrounding socio-historical reality" (Švelch, 2020). Extending this analysis, Nick Webber (2023) emphasises the potential for refocusing our attention on the connections and links that paratexts and paratextuality draw upon. To Webber, who is "unconvinced that paratextuality is a quality of a cultural artefact in itself", it is the *relational* quality of 'paratextuality' that should be prized, because "there is no paratextuality in isolation" (2023, p. 82). In this view, it is the relationships between cultures, cultural artefacts and texts that are paratextual. Through this relational quality, cultures, cultural artefacts and texts foster, influence and capture meaning and emergent experience in one another, and reveal to us the "network of things being connected with yet distinctly not the text" (Seiwald & Vollans, 2023, p. 3).

Another way of understanding recent scholarly efforts to refocus discussion on 'paratextuality' and connectivity is to see them as highlighting the intimate connection between the 'paratext' concept and videogame assemblages more broadly. Paratextuality is a way of thinking about the countless connections between textual, cultural, social, material and political actors in the assemblage of play and how these linkages and interactions generate meaning within play. I embrace this focus on paratextual relationships and, ultimately, agree with Švelch and Webber's arguments that we must be careful not to suggest, through the use of the term 'paratext', a rigid textual hierarchy that places user-created texts as subordinate to a 'core' text. However—and this may seem paradoxical—I also continue to use the term 'paratext' to describe user-created textual artefacts that capture or reflect on experiences of play. By grounding my discussion in the notions of assemblage and emergence I hope to be clear that I construct no hierarchy: texts, paratexts, cultures and other conditions surrounding play jostle equally for attention and influence in the production of play experiences and textuality. As Jane Bennett observes, assemblages are not governed or hierarchised; no individual element or material within one "has sufficient competence to determine consistently the trajectory or impact of the group" (2010, p. 24). In methodological terms, my suggestion is that 'paratextuality' allows

a keen focus on the connections between emergent player experiences and elements of the assemblage of play, and 'paratext' affords a term to identify the textual artefacts created by those players as a consequence of that assemblage.

What player paratexts reveal

Amitav Ghosh, writing about the relationship between literary fiction and the Anthropocene, argues that in an era characterised by the violence of climate change, our everyday life is permeated by "inconceivably vast forces that have now become impossible to exclude, even from texts" (2016, p. 63). Taking an approach that draws upon ecocritical game studies, media materialism and assemblage thinking, I propose a similar case. Videogames are entangled and intertwined with the material conditions of their production, distribution and play, as well as other surrounding social, political and cultural influences, such that they are permeated by the conditions of the Anthropocene. Games carry with them their planetary inheritance, irrespective of whether their developers intend for them to speak of, or demonstrate, ecological and environmental relations. The capacity of videogames to foster emergent experiences for players mirrors the lived experience of an era where "forces of unthinkable magnitude" combine to create "unbearably intimate connections over vast gaps in time and space" (Ghosh, 2016, p. 63). As games and their assemblages are set into motion through play, spatial and temporal distances collapse in unpredictable ways. Players are imbricated with ecologies and ecological dynamics that reside in, and emerge from, different actors across these assemblages. Paratexts become crucially important to understanding these dynamic and ephemeral experiences largely overlooked by existing ecocritical frameworks. Paratexts capture and reveal traces of the play experience, acting as a kind of roadmap for scholars and players alike to retrace unexpected ecological encounters with games. To elaborate on the ecocritical function of player-created paratexts, I will explore three characteristics of emergent ecological dynamics that such artefacts are able to capture and manifest particularly acutely: qualities of *entanglement*, *awareness* and *affect*.

Entanglement

Player-created paratexts have the capacity to reveal the entanglement of play with surrounding cultural, political and ideological conditions. An example can be found in Tom Apperley's (2018) investigation of the player communities surrounding the historical strategy games *Europa Universalis II* and *Victoria: Empire Under the Sun*. Apperley finds that paratexts created and shared within these communities demonstrate players' emergent encounters with histories that exceed and modify the representations of the past encoded within the game texts. Players' experiences of history are not tethered to the 'official' accounts presented by the games; rather, they are highly contextual, blending the games' historical narratives with individual and community understandings of past and present, as well as local and global cultures. By actively negotiating these variables, players develop 'counterfactual' accounts of

history that arise from their play. These counterfactual imaginaries are then "made tangible through the production and sharing of paratexts that remix the official history of the games to include other perspectives" external to those found within the games (Apperley, 2018, p. 1).

In considering ecological dynamics within games directly, Ben Hall and I (May & Hall, 2023) build on Apperley's perspective through analysis of paratexts created by players of the city-building simulation *Cities: Skylines*. We consider popular trends within the game's player communities to pursue the development of ecocentric cities, developed in sympathy with their natural surrounds and which exhibit qualities of sustainability and eco-consciousness across different aspects of their urban infrastructures (including energy generation, waste disposal, housing design, and so on). Our analysis of a range of user-created paratexts demonstrates that the ecocritical meaning associated with such efforts at ecocentric play is inevitably (and often unwittingly) intertwined with currents of Anthropocentric power and discourse. Drawing on architectural and aesthetic histories, Hall and I observe that seemingly eco-conscious urban design decisions made by users come to "unwittingly reflect and sustain anthropogenic relationships with the land" (May & Hall, 2023, p. 12), that industrial capitalism inflects players' relations with natural resources (2023, p. 15), and that a contemporary logic of cybernetics drives players to optimise and maximise the ecological violence of human settlement (2023, p. 17). Players' attempts to build virtual cities summon up entanglements that lie far beyond the game itself, within the conditions of the Anthropocene and its underlying ideology and economic order.

Both these examples reinforce the fact that games are able to cultivate experiences for players that diverge from the accounts and paradigms contained, and intended, by game texts themselves, whether historical or ecological. These emergent and divergent experiences and imaginaries draw in elements of material and cultural ideological assemblage that surround the player. It is paratexts that allow such situated entanglements to be recorded, preserved and consumed by others. For Ben Hall and I, player paratexts are thus uniquely positioned to illustrate the "porosity of both our lived material conditions and the digital game objects we play" by capturing examples of the ecological dynamics of the Anthropocene actively shaping in-game ecological relations pursued by players (May & Hall, 2023, p. 18). Apperley suggests, similarly, that while historical strategy games are limited in their capacity, as texts, to simultaneously present, destabilise and re-negotiate histories, they afford the conditions for players to palpably explore these possibilities alongside their own "highly localized" knowledge of the world, cultures and dominant paradigms (2018, p. 16). Paratexts then allow users to remediate these play experiences, laden with new, unanticipated and entangled meaning, for others to consume (2018, p. 3). This demonstration of the entanglement of play with its surrounding assemblages is the first key contribution made by paratexts to the methodological project of uncovering emergent ecological dynamics at work.

Awareness

A second important aspect of the relationship between paratexts and emergent ecological dynamics is the capacity of user-created artefacts to illustrate modes of ecological awareness among players and play communities. This is a characteristic that builds upon the tendency previously described for paratexts to record and represent entanglements with realities beyond the game, but re-orients focus from the general play experience to the attitudes and inclinations of players themselves. Nicolle Lamerichs (2024) offers an example in a study of various sustainable fandom practices that surround games. Addressing 'ecomodding' (which they define as user-created technical modifications to games that enhance their focus on, or sympathy toward, ecologies and environments), 'ecocosplay' (sustainable production practices in the material aspects of cosplay) and green board gaming ('eco-friendly' practices within analogue game design and consumption), Lamerichs outlines increasingly popular modes of "responsible consumption" that allow players to infuse games and play with personal values related to sustainability (2024, p. 543). While material practices figure centrally in these forms of sustainable fandom, discursive acts are equally significant. Sustainable practices are captured and disseminated in paratextual form, allowing players to engage in "critical discourse around companies, knowledge sharing around production and consumption" and to grow a culture of "greening of one's own fan activities" (Lamerichs, 2024, p. 544).

The emergent inflection of videogame experiences with players' recognition of the catastrophic ecological conditions of our era is apparent in further paratext-focused studies. Gabrielle Trepanier-Jobin et al. (2024) trace the diversity of player responses to the ecocritical messages contained within the underwater adventure game *ABZÛ*. The authors gathered over 2000 relevant user posts from a range of discussion fora, games journalism websites and social media platforms. These paratextual artefacts reveal that posts, paratexts, and discussions related to users' ecocritical experiences of play enable online play communities to act as "spaces where collective ecological awareness can develop", as players share their different experiences and interpretations of the environmental messages apparent within *ABZÛ* (Trepanier-Jobin et al., 2024, p. 311). Trepanier-Jobin et al. make the important observation that while those players of *ABZÛ* studied in their chosen communities clearly engage in the production of paratexts in order to record their engagements with ecological dynamics, these communities "rarely create a coherent or reliable response" (2024, p. 328). Instead, a striking diversity of player responses are witnessed, as each user—I would suggest—draws on their particular assemblage of play to inform their encounter with in-game ecologies. This is a finding echoed in one more example: Ben Hall's and my (May & Hall, 2024) paratext-focused examination of *Battlefield 2042*'s ecocritical potential. Through paratexts related to this multiplayer first-person shooter, shared in three different player communities, we identify a multiplicity of player encounters with ecological thought (a form of ecological awareness that relates to the revelation of interconnectedness and entanglement), ranging from resonance and agreement to abjection and outright rejection.

Lamerichs also draws attention to the "ripple effect" of user-created paratexts: that ideas of sustainability and sustainable play can spread across play communities "through different texts, through streams and memes, reaching new audiences", who might not otherwise be prompted to consider such approaches to play (2024, p. 547). As an example, Lamerichs considers how the 'Eco Lifestyle' expansion for the game *The Sims 4* stimulates the production of paratexts by players who offer advice on minimising game characters' virtual carbon footprints, which in turn motivates users to discuss their own lifestyles and choices outside the game. In the idea of ecological 'awareness' that I associate with paratexts, I therefore suggest a double-meaning. On the one hand, paratexts can capture the play-bound emergence of experiences that are characterised by recognition of, and reflection upon, ecologies and ecological dynamics. On the other hand, paratexts are a portable artefact designed to be uploaded, posted, shared, recommended and ultimately consumed by other players. This means that paratexts, and the players who create them, are able to *share* emergent ecological dynamics with one another. 'Awareness' speaks not only to the moments of ecological revelation that play might encourage, but also to the possibilities for awareness of other players' situated experiences—which, without paratexts, would be individual, ephemeral and invisible encounters with the eco-material assemblages of play.

Affect

A third notable strength of paratexts is their potential for communicating experiences of *affect* that might arise in players' encounters with emergent ecological dynamics. Players' affective responses to what unfolds during their interactions with a videogame parallel in many ways the contingent nature of the play experience itself. Affective states, after all, emerge in unpredictable and dynamic ways; they are transitory (coming into view only briefly to inform emotional responses, thought, decision-making and action) and draw on the dimensions of personality, experience, memory, culture and emotion that make up the assemblage of a particular user's subjectivity. As a transitory state, affect is itself ephemeral. When layered on top of one form of the ephemerality of the game experience itself, we might understand players' affective responses as being recursively ephemeral (and doubly difficult to capture and analyse). The paratext, whether in the form of a written account of play, an evocative screenshot, or a richly layered piece of fan art (to name only a few examples), is positioned to capture affective structures in a 'snapshot' of the situated moment of play it provides. In an earlier example, Marcus Carter (2015) considers the creative work of the various user-propagandists affiliated with different player alliances and factions in the massively multiplayer online role-playing game *EVE Online*. Amidst the heady context of long and impassioned player-versus-player wars that are waged across *EVE Online*'s virtual galaxies, a number of players are shown in Carter's study dedicated to the craft of virtual, paratextual propaganda. Images are produced, and shared in online fora, with users "leveraging broader Internet

memes; 'nerd' tropes; in-jokes; game history; and racial, cultural, and sexist stereotypes" in order to "bolster support and demoralize opponents" (Carter, 2015, p. 311). Either by appealing to their comrades' morale or assaulting the confidence of opponents, these paratexts and their creators are seen as hoping to elicit affective responses from other players. Carter details strategies of aesthetic remediation, historical parallelism and popular cultural mimicry that are consciously deployed in efforts to capitalise upon, and manipulate, players' places within a "complex assemblage of social, historical, and cultural contexts" to provoke particular modes of feeling (2015, p. 335).

This capacity of paratexts to evoke affective states is evident in Rainforest Scully-Blaker's (2024) consideration of the */r/patientgamers* community on Reddit (a community dedicated to those who return to play videogame texts long after their original dates of release). Investigating whether the community's distinctive approach to play might be read as an act of resistance to the neoliberal instrumentalisation of leisure time, Scully-Blaker finds that these users' paratexts demonstrate their entanglement in particular affective structures. Namely, players capture their desires for forms of comfort (often sought and seemingly never quite found through contemporary play experiences) and bittersweet nostalgia (for lost childhoods and times of 'innocence', where play featured more centrally in their lives). In an auto-ethnographic reading of the western-themed action-adventure game *Red Dead Redemption II*, Paolo Ruffino (2022) charts his engagement with user-created paratexts as he comes to terms with a significant narrative development during the game (the revelation of terminal illness suffered by the player's own character) that for players frustrates their sense of agency over story, self and environment. As the author becomes immersed in the game's online communities, and other users' attempts to respond to and (futilely) overcome this critical and agentially disruptive turning point in the game, they note that affect is the defining function of the paratexts analysed. Ruffino highlights a "performative potential" underlying paratexts created by players, which upon consumption by others can "bring about affective states that open the possibilities of the text and on the political potential of these openings" (2022, p. 348). The paratext, in this reading, is an illocutionary artefact. It might summon up states of feeling (anguish, helplessness, anger, mastery, resolution), which can then spur on refigurations of a player's own sense of the meaning of the game text, its world and its narrative.

Conclusion

In this article I have put forward both a conceptual and a methodological intervention. Emergent ecological dynamics are a way of thinking about instances of ecological representation, relations and interaction that occur in videogames and which are not currently theorised by text-centric ecocritical models within game studies. Of course, it is not a new claim to suggest that players negotiate and perform their play in concert with the cybernetic systems of videogames, or the assemblages that

surround them, rather than the nature of play experiences being solely defined by texts. The specific contribution I hope to make here is highlighting the unanticipated, variable and situated ecocritical meaning that can emerge because of such assemblage, and how the immanent materiality of digital games means our present planetary conditions find their way into everyday play. In light of the compounding crises that defines the Anthropocene (or any other label one might apply to these fractious times), there is an urgent need to examine the manifold (and unconventional, with respect to the focuses taken within ecocriticism and the environmental humanities to date) ways in which ecological concepts and experiences are encountered today.

The idea of unpredictable and dynamic ecological dynamics that emerge in ever-changing individual play experiences also raises the question of how we—as scholars, and also as players—might access such ephemeral and transitory encounters. I have argued that paratexts act as vehicles for capturing and propagating these emergent experiences. Just as Bianchi (2017) and Caracciolo (2021) suggest that particular structures or aesthetics of play might offer revelations about our lived conditions of non-human kinship and ecological entanglement, emergent ecological dynamics in videogames similarly draw upon and illustrate the interconnection between players and their games, and the different actors, entities and agencies that make up our worlds. User-created paratexts not only bear the potential to capture the emergent ecocritical meanings that emerge from these interconnections, but can also render legible players' own revelations of the material and cultural assemblages of play and of ecologies themselves.

In detailing the potential for paratexts to grant insight into the fleeting ecologies summoned through play, I have highlighted the capacity of paratexts to illustrate entanglement, communicate awareness and conjure affect. This is not to suggest that these are the *only* qualities of such artefacts that we might pay attention to as we consider the ecological dynamics that emerge from the shifting assemblages of play. Rather, these are paratextual properties that are particularly helpful to an ecocritical analysis of games: entanglement, because our intertwining with the surrounding material conditions of our planet is the fundament of human–nature relations; awareness, because its development is central to the projects of hope, optimism and change amid ecological crises; and affect, because in an age where we are overwhelmed everyday by the symptoms of Anthropocentric devastation, visceral states of feeling offer powerful means to cut through catastrophe, confusion and powerlessness.

I have also drawn attention to the three qualities of entanglement, awareness and affect because of their evidence in limited existing paratextual research. Continuing the theorisation of the emergent ecological dynamics of videogames could well illustrate various other strengths of paratextual artefacts in the preservation and sharing of these ephemeral moments of ecocriticality produced by the assemblages of play. The methodological provocation I hope to have presented in this article is that because of the nature of the assemblage of play, our 'real world' ecologies and

material conditions are latent within videogame texts and play cultures. These conditions re-emerge through play in unanticipated and novel ways and, crucially, often in ways that were not designed or envisioned by game makers. By taking up the task of examining (in more detail and across more game texts, genres and player communities) the creative artefacts produced by players as a consequence of play, game studies scholars might deepen understanding of how our ecological reality, and the conditions of a fractious Anthropocene era, permeates play. The concept of emergent ecological dynamics thus invites a new kind of ecomaterialist project within game studies, tracing the influence of the material on digital textualities by focusing not on videogames as texts, but on the emergent phenomena that characterise the situatedness of videogame experiences, phenomena which player paratexts grant unique access to.

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