Part I

Today's Challenges: Games for Change

1. Change for Games: On Sustainable Design Patterns for the (Digital) Future

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Abstract

The United Nations Environment Programme launched the Playing for the Planet (P4TP) initiative in the fall of 2019, closely followed by the International Game Developers Association's (IGDA) Climate Special Interest Group (SIG) in the fall of 2020. While the P4TP alliance has focused on company-level interventions, the IGDA Climate SIG has worked in a more grassroots fashion to develop both game and design-patterns databases. These parallel efforts invite important philosophical and practical questions. What are sustainable games? Are they the same thing as sustainably developed games? Are they games with overt environmental messaging, or ones whose production or consumption carbon footprints have been minimized? Or, most radically, are they the games we refuse to play?

Keywords: game design, game industry, game production, tactics, climate

To be sure, much of what goes on under the guise of design at present involves intensive resource use and vast material destruction; design is central to the structures of unsustainability that hold in place the contemporary, so-called modern world.

—Arturo Escobar, *Designs for the Pluriverse* (2017, 1)

Game studies has generally evolved independently of the game industry, despite occasional crossovers and a growing, but still scant, catalog of ethnographic and media-industrial studies of game development companies, festivals, conventions, and so on (Van der Graaf 2012; O'Donnell 2014; Parker et al. 2017; Bulut 2020). Games have, by dint of great efforts by academics

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of all stripes, earned the privilege of being treated like other cultural or media objects. Like novels or films, they may now be subjected to scholarly interpretation and critique, often severed from authorial intent, if one can even speak of a singular intent when games are created by teams of dozens to hundreds of people. All this has its merits, of course, but the practice of opining on games apart from their contexts of production seems less and less desirable as we move ever more fully into the climate-disrupted future. Although my own work has primarily employed textual analysis guided by insights particular to environmental science and communication, in order to identify both harmful and beneficial models of ecological relations embedded in games, without opening a dialogue with those actively creating games, my arguments may at best produce an analytical shift without systemic change. As Escobar observes in the opening epigraph, design is essential to modern life, yet the bulk of what qualifies as design does not take into account negative impacts on the biosphere and more-than-human beings. Later referencing design theorist Tony Fry, Escobar labels unsustainable design practices as practices of "defuturing" (2017, 16), or the reckless foreclosure of potential planetary outcomes.

Within the circumscribed ambit of games, then, how can scholars help to ensure that game design is not the defuturing kind? This might necessitate many parties working outside of their usual comfort zones, from researchers engaging with industry and vice versa, to activists and policymakers engaging media makers as critical to changing the environmental status quo. What follows is an embedded media-industries research account of how pursuing more sustainable games precipitated such a novel collaboration between academics, developers, and nonprofit organizations. While there may be an unresolved tension between calls for more environmentally intelligent games (matters of content) and calls for more sustainable production techniques (matters of context), this should still serve as an instructive case study for those looking to change the game industry from within and to find allies in greening digital production.

My book, *Playing Nature: Ecology in Video Games*, was published in December of 2019, and my modest hope was that it would circulate among a small circle of scholars interested in games and/or the environmental humanities. Although I had written the book and several shorter pieces with an eye toward articulating design principles and had even collaborated on the creation of a game based on my own recommendations (Chang 2019a; Chang 2020), at the time I had had very little interaction with the games industry or opportunities to deploy theory in design. This changed in October 2020, as the world lay largely dormant in the wake of the novel

coronavirus. It was then that a woman named Paula Escuadra reached out to me, in her capacity as the cochair of a new Climate Special Interest Group (SIG) within the International Game Developers Association, or IGDA. To my surprise, Escuadra was familiar with the book and invited me to attend some of the SIG's first meetings, and at least a few of her colleagues at Google's cloud gaming service Stadia had also read my work about the implicit environmental messages of games. For me, this was exciting evidence that scholarly introspection could have broader currency. While I had always envisioned my work as not simply a template for environmental media critique, but also for environmentally minded design practices, short of passing out free copies of my book at the annual Game Developers Conference, I had little sense of how to engineer such connections without brazen self-promotion or microcelebrity status.

Not entirely sure of who or what was involved, I nevertheless attended some of the IGDA Climate SIG's first working sessions in the fall of 2020, aimed at determining its eventual scope and anticipated outcomes for 2021. In the numerous meetings I have participated in since those early days, I was often the lone academic, although Benjamin Abraham joined initially, and doctoral candidate Clayton Whittle has been especially instrumental as the main author for the "tactics" report described in great detail later in this chapter. Most of the SIG's members, as would be expected, are workers in or around the game industry, from independents and those working in related spaces in the nonprofit sector to employees at large multinational game or technology companies.

According to the IGDA itself, the organization has over 5,000 paid members as of August 2021, as well as some 150 local chapters and global special interest groups. To give some sense of how SIGs function within the IGDA, they are completely voluntary and as of this time divided into three categories: advocacy, discipline, and affinity. The relatively new Climate SIG falls into the advocacy group, along with the longstanding Game Accessibility SIG and others devoted to LGBTQ+ matters, allyship, anti-censorship, mental health, and so on. By far the greatest number of special interest groups is present in the discipline category, which appears to revolve around issues of craft in game form and content. For instance, there are discipline SIGs dedicated to analog games, serious games, audio, localization, and the cloud. Finally, the affinity category invites members to affiliate based on shared identity characteristics, with SIGs like Black in Games, Chinese in Games, or Devs with Kids.

Granted, as the Climate SIG has expanded its roster and clarified its target goals, to be discussed momentarily, it has become overwhelmingly clear that

advocacy inevitably overlaps with affinity groups and the design-oriented nature of disciplinary SIGs. People advocate from a place of shared values and are looking to include aspects of those values in their work as game designers.

Sustainable design patterns

Early on, members of the Climate SIG, led by Escuadra and cochair Hugo Bille, a game developer who worked on the Electronic Arts game *Fe* (Zoink Games 2018) and *They Breathe* (The Working Parts 2011), opted to divide and conquer with several "workstreams." While this chapter will focus almost entirely on the "design patterns" workstream, it is worth first briefly describing each of them to give a sense of the scope of the SIG's considerations as well as the challenges, discussed later, of spreading leadership and volunteer effort over several areas:

- Climate guide: In this workstream, members are trying to create a simple, "climate facts" reference document for time-strapped game professionals who want to educate themselves on climate issues, especially as they pertain to the game industry. As part of this, members have reached out to youth movements like Earth Uprising and Sunrise and looked at comparable business and policy documents, all while trying to push beyond Western case studies and taking note of parallel movements in other media industries like film and television.
- Climate councils: This workstream entails more direct advocacy and aims at systemic change through organizational change. The principal idea is to establish "climate councils" at as many game companies as possible, with the goal of eventually forming an industry-wide climate advocacy network. In a way, the Climate SIG is already doing this at a less formal level, with many companies unofficially represented in the SIG's membership, including Google, Ubisoft, ustwo Games, and a wide variety of smaller studios and one-person operations.
- Industry benchmarking: Members in this workstream hope to gather data on game companies' carbon-reduction strategies to create both benchmarking guidelines and best-practices resources for corporate adoption.
- Design patterns: This workstream is geared toward giving game developers practical tools and examples to help infuse sustainability into game design and business decisions.

Of these four original workstreams, "design patterns" has proven to be one of the most active, perhaps because it offers such tangible and manageable ways to contribute, and is closest to the core membership's daily concerns—that is, how to design games.

Before proceeding, we might profitably linger over the term "design patterns": What exactly is being designed in these patterns, and if so, by whom? Although Escobar would have it that "everybody designs" (2017, 2), design in its professional manifestations is typically policed by tastemakers and gatekeepers of all kinds, from hiring managers and university administrators to consultants needing to distinguish their expertise from amateur efforts. Presumably, the Climate SIG is addressing its constituency of game developers, who engage with game design, and thus the patterns in question must be in some way part of the game development process. However, that still leaves a fair amount of leeway. In addition to promoting environmental realism in graphical representation or game mechanics, like botanically accurate plants, or opting to make supplies finite in a game that involves resource use, could design patterns also include, for instance, procurement strategies for the energy used to power the computers on which a game is developed? A decision to distribute a game via digital download rather than in shrink-wrapped boxes? Encouraging players to play a game in a low-resolution, power-saving mode when on the move or in a distracted state? Perhaps the latter would be better labeled "development patterns" or "distribution patterns"?

As a participant-observer in the Climate SIG, it has been illuminating for me to see how the language of design patterns has shifted over time. I originally gravitated to this workstream because the idea of design patterns so closely resembles the ways that we academics talk about games in terms of discrete and observable gameplay elements—like the way a frog crosses a river or busy road by hopping in cardinal directions in *Frogger* (Konami 1981), or the way game time is compressed in *Stardew Valley* (ConcernedApe 2016) or *Passage* (Jason Rohrer 2007)—but at scales ranging from the minute to commonalities by genre and beyond. Game studies scholars have endlessly invented or borrowed arguably synonymous terms for design patterns: game mechanics, unit operations (Bogost 2006), procedural rhetoric (Bogost 2007), "allegorithms" (Galloway 2006), or what Noah Wardrip-Fruin has recently restated at a more foundational level as "operational logics" and "playable models" (2020).[1] Furthermore, "design patterns" almost certainly

1 In Wardrip-Fruin's (2020) formulation, for example, collision is a logic, and 2D spatial games like *Pong* (Alan Alcorn 1972) and *Space Invaders* (Tomohiro Nishikado 1978) are one class of playable models.

references earlier debates and discourses in game design and architecture, particularly the "pattern language" methodology of Christopher Alexander and his collaborators (Alexander et al. 1977; Holopainen and Björk 2003).

Yet the word "patterns" also evokes sewing patterns and more craft-oriented design work, itself an important material and feminist trend within critical design studies (Rosner 2018; Sayers 2017; Monteiro 2017). Importantly, for Escobar,

> design refers to much more than the creation of objects (toasters, chairs, digital devices), famous buildings, functional social services, or ecologically minded production. What the notion of design signals in this work—despite *design*'s multiple and variegated meanings—is diverse forms of life and, often, contrasting notions of sociability and the world. (2017, 3)

If we take this concept of design seriously, design patterns can and should refer not just to objects or things (a game file, a device), but also to the relationships they engender and a holistic sense of the worlds that are brought into being *by design*. This is, I suppose, a way of saying that design patterns need not just be building blocks, to be slotted into an existing game design to add just the right amount of green consciousness. Rather, they are strongest when they are left open-ended, flexible, requiring the input of players.

Curiously, however, something about the phrase "design patterns" proved unappealing to the core group of people working on them (the workstream is helmed by SIG cochair Bille and Arnaud Fayolle, an art director at Ubisoft). The terminology gradually shifted more toward action-laden terms. In fact, the design patterns workstream eventually split into three, interrelated parts: a "tactics" report, an "actions" wiki, and a games list. The remainder of this chapter deals with the tactics report, which was provisionally titled "The Environmental Game Design Framework: An Evidence-Driven Developer's Guide to Creating Games with Impact." However, it is worth noting that the newly relabeled design patterns (now "tactics") will at some point be integrated with the wiki and games list. The wiki is built around more general modes of climate action, for example, "normalizing green tech" or "forging emotional bonds with nature," while the games list essentially compiles as many games as possible that in any way engage environmental crisis, either via more macro-level "actions" or micro-level "tactics."

After many months of crowdsourced authorship, editing, and design, the tactics report was released in alpha form in April 2022 as *The Environmental Game Design Playbook* (Whittle et al. 2022). The *Playbook* is an over

eighty-page academic-leaning document detailing psychological barriers for environmental action and the design patterns, or tactics, that games can use to bypass or break down those barriers. As mentioned earlier, Whittle, a doctoral student in education, is by far the primary author of the document (hence its unofficial nickname within the SIG, The Clayton Report), and thus it draws heavily from the literature on educational and serious games. The playbook begins with a brief primer on environmental psychology and the predictors of positive environmental behavior and presents a few overarching frameworks for thinking about game-driven environmental change, in particular, Sabrina Culyba's Transformational Framework and the Ouariarchi Framework (Culyba 2018; Ouariachi et al. 2019). The playbook then moves on to the second part focused on tactics, prefaced with the question: "How might we make our game impact players in the way we intended?" Again, the report, as with many of the workstream's and overall SIG's deliverables, is meant to be read and used by developers short on time but still interested in positive climate action.

Currently, the design patterns/tactics are organized into the following, not necessarily comprehensive categories, ranging from the specific (Mechanics and Procedural Rhetoric; Narrative; Mixed Reality Designs) to the more abstract (Systems Knowledge and Simulations). Part 3 of the playbook is reserved especially for interpersonal and community gameplay tactics (Social Play; The Metagame). Each tactic's description follows the same template: a brief paragraph introducing the tactic, a hypothetical development scenario ("conceptual example"), reasons why to use the tactic, and more details about the tactic, including caveats and suggestions for deployment. Each tactic section also highlights at least one existing example game that uses said tactic. For instance, the tactic "No-Win Scenarios" (Whittle et al. 2022, 35) describes games where defeat is inevitable (but instructive), and as an example development scenario, suggests a game about running an oil company in which resources sooner or later run out and the company goes bankrupt. As an example game that uses this tactic well, the report features the often-cited newsgame, *September 12th: A Toy World* (Gonzalo Frasca 2003), in which retaliation against supposed "terrorist" others in the wake of the 9/11 attacks only generates more foes, radicalizing grieving bystanders (Whittle et al. 2022, 37). Finally, the remainder of the tactic's entry explains that no-win scenarios are best used as education, rather than punishment, and that they can be effective even though they fly in the face of the traditional tenets of good game design. They are especially helpful, write the authors, in terms of drawing attention to complex structural or systemic problems.

In the narrative category, we find tactics like Roleplay and Conflicting Goals. Conflicting Goals, to expand another sample, is described as presenting the player with competing objectives, like greening the energy grid of a town (as mayor), while also upgrading its transportation infrastructure. The global management-scenario game *Fate of the World* (Red Redemption 2011) is listed as a model, and the tactic is to be valued because it encourages players to see decisions less as binary than as multivalent, with inevitable trade-offs. While it is not always entirely clear why tactics in this category are more oriented around story than mechanics (game studies' apocryphal ludology and narratology debate shuffles quietly in its crypt here), this overlap is perhaps inevitable when trying to compartmentalize design matters. It may at some point prove more useful to consider these categories more as descriptors, rather than mutually exclusive domains, so that individual tactics can and should carry multiple attributes (for example, role-play can be social, while also exploring a no-win situation).

Further, the Mixed Reality Designs and Systems Knowledge and Simulations Tactics sections emphasize more serious games that encourage deliberate crossover between game and real world, from games that require the taking of action to games where you collect scientific data or inhabit an experimental attitude. Although the bulk of the SIG's documentation thus far represents digital games, these categories theoretically leave the door open to use by analog game designers, or even artists, architects, or other creators that make games, but might not consider themselves game designers—for instance, Janette Kim's many games about climate change, gentrification, urban planning, and sea-level rise, including *Bartertown* (2017), part of the ironically entitled series *Win-Win*.

The report's final part is, again, devoted to multiplayer contexts and player sociality, as well as the "metagame" around games themselves, that is, game paratexts and fan communities, which helps to round out the discussion of individual tactics and single-player games.

Challenges

The Environmental Game Design Playbook, which is still in provisional form, provides a nominal basis for thinking through systemic change from within the very institutions contributing to technological overwhelm, destruction of habitat, and labor exploitation, even as they also create meaningful and widely shared forms of culture. Much of my analytical interest in the SIG has been in trying to ascertain just where agency lies in the games

and environmental nexus—that is, Who has the power to effect change? The obvious answer, given the SIG's umbrella organization IGDA, is game developers. Yet, to return to the tentative academic–industrial–nonprofit alliance with which we started, we might add that games researchers are also deeply invested in these matters, as well as many players and policymakers. Moreover, game developers are not the only ones who design. Not even in the strictest sense if we include the work of modders, and not when design is seen as deliberate creative decisions that produce particular worlds and ways of being. It is perhaps better to think about who has the power to effect change at what level, or in what ways.

Right now, the Climate SIG functions as a kind of megaphone aimed at the industry writ large, amplifying the concerns of its membership, and searching for footholds to shape proenvironmental behavior and attitudes at the scale of both individual developers and corporations. The SIG also has an ambiguous but mutual relationship to the United Nations' Playing for the Planet (P4TP) initiative, which was launched in September 2019, and interestingly, despite the name, places the onus of change on companies rather than players. The Playing for the Planet Alliance (P4PA) now boasts over forty member companies, from behemoths like Microsoft and Sony to smaller studios like Strange Loop Games, all of which "have made voluntary, ambitious, specific, and time-based commitments for people and planet" (P4TP n.d.c). This emphasis on corporate innovation aligns well with Abraham's impatience with generalized hopes and fears surrounding what games can do in *Digital Games after Climate Change* (2022). Abraham argues that we are misguided if we believe that games alone could convince climate change denying players to accept that reality, let alone make the world a better place through some version of wishful, osmotic uptake of enlightened game content. Thus, he sidesteps ecocritical approaches almost entirely in favor of studying game companies that have taken concrete steps toward sustainable operations and advocating that the game industry green its supply chains primarily through the use of renewable energy and digital distribution.

Of course, there's a strong case to be made for both the Playing for the Planet initiative's and Abraham's insistence on corporate-level intervention. Many scholars in environmental communication and journalism have expressed skepticism over corporate and governmental attempts to displace environmental responsibility onto consumers, rather than addressing it internally (if you'd just buy energy-efficient light bulbs!) (Supran and Oreskes 2021; Monbiot 2019). There is understandable and widely shared discontent with the limitations of individual choices, as well as a desperate yearning for collective

action and system change. In terms of games research, I have found writing more directly about media infrastructure as somewhat soothing to these worries and have embraced Lisa Parks' excellent advice to start describing media less as given objects than in terms of their energy–media matrix (2019).

That said, however, for a number of reasons I suspect we ought to distribute our hopes for games more broadly. For one, we have seen that companies like Microsoft and Apple can spin a good yarn about going carbon negative, their corporate philanthropy, progressive politics, and so on, while still working behind the scenes to support lobbyists looking to sink social and environmental reform (Milman 2021). Careful work needs to be done to distinguish genuine efforts toward decarbonization from greenwashing. I am also not quite ready to give up on players, or designers, recognizing that system change can happen from within or without, at various scales, and through strong and weak ties. The ongoing example of the IGDA Climate SIG already provides ample rationale for why we ought to support intersecting roles, where developers are also players, activists, and concerned citizens. The SIG successfully hosted one of the advocacy microtalks at the 2021 Game Developers Conference (GDC), and has also helped with various eco game jams, like the P4PA's Green Game Jam or the now annual IndieCade climate jams. Notably, the Playing for the Planet Green Game Jams have not been "jams" in the standard, amateur, or independent sense, but periods during which companies in the alliance pursue game-based and metagame "activations," "such as new modes, maps, themed events, storylines and messaging" (P4TP n.d.b). Although one company, PlayStation Studios Media Molecule, did host a more traditional game jam using its game-creation platform Dreams, most opted to create new content for existing games. One alliance member, TiMi Studios, hosted a separate Green Game Jam for Youth, which invited teams to pitch original game ideas or "activations" in existing games (TiMi Studio Group 2021).

In the Playing for the Planet initiative's UN-guided work, the term "activation" is significant in its common recurrence, and like "tactics" carries with it the search for demonstrable behavior change and concrete deliverables. According to P4TP's 2021 Annual Report, "Green activations refer to educational content related to different environmental topics, integrated in video games" (P4TP n.d.a). This is, admittedly, a lackluster definition, and one that unwittingly treads on long-running debates over gamification and the impact, if any, of serious games.[2] To me, the word "activation" has a faintly scientific tang to

2 Having once worked on a game about asthma in California's Central Valley, for which I conducted pre- and posttest surveys with high school students who played a prototype of

it (activation energy being the energy required for chemical transformations to occur), as well as military undertones (as in, "Activate the reserve guard!"). Activation also raises the specter of whether design patterns are just green "nudges," a notion popularized by Richard Thaler and Cass Sunstein (2008) as a way to gently prod people in the right direction without disturbing them too greatly (one prototypical example is refusing disposable plastic straws or replacing them with reusable ones). This is, once more, a question of system change and how it happens, through minor and incremental, but cumulatively impressive change, or through wholesale changes, maybe even … revolution? After all, the concept of the green energy transition is easily and tantalizingly achieved in language, but in practice demands a veritable paradigm shift, one incommensurate with existing infrastructure and assumptions about how nations and economies should work.

Thinking again about tactics, we could eschew the whiff of military rhetoric in favor of Michel de Certeau's well-known philosophy of the everyday, where tactics are practical, on-the-ground responses to the strategies of the dominant (2011). Design patterns could, in theory, expand to include more base-level interventions into game design practice, which encourage more mindful use of onboard computer or device resources as well as networked resources, in terms of energy. Developers are likely to classify such steps less as design than optimization, or a matter of efficiency more so than aesthetics, but niche efforts linking energy and processing limitations to satisfying design are already underfoot in other areas, from retro or 8-bit games, to text or tiny game jams, to the Small File Media Festival. This festival started in 2020, a product of the School for the Contemporary Arts at Simon Fraser University in Vancouver, and it specifically targets young filmmakers:

> We invite young makers who care about the environment to make small-file videos. Why small files? Because streaming video is responsible for one percent of global greenhouse gas emissions! That's because the data centres, networks, and devices we rely on for streaming are mostly powered by fossil fuels. The Small File Media Festival celebrates videos of under five megabytes that show movies don't have to be big HD files to be beautiful and inspiring. ("Small File Media Festival Youth Contest" n.d.)

the game, I find the logic of activation familiar but still somewhat off-putting. Although it is understandable to feel the desire to see change happen at a time when inertia at political and social levels is stymieing decarbonization, energy transition, and environmental justice, change is not always something we can quantify.

Although the Small File Media Festival initially prioritized 5 MB or smaller video files, the 2021 iteration expanded that limit to include a "bingeworthy" category allowing up to 22 MB and solicited a wider "range of works including looped, data moshed, executable and cinematic works." Continuing on, however, the organizers cautioned, "These tiny files have big hearts and will be streaming to you at no more than one megabyte per minute" ("Small File Media Festival" n.d.). The festival is a public-facing and practice-based extension of what Laura Marks and other cinema and media scholars have recently investigated, namely, the carbon footprint of streaming media (Marks et al. 2020). Lucas Hilderbrand, for instance, argues for the planetary friendliness and pedagogical efficacy of watching films together in a classroom or theater rather than individually streaming them at home, while Marks contends media consumers should mentally liken streaming high-quality video to eating a steak—both being the extravagant culminations of hugely resource intensive and largely unsustainable land and energy practices. Yet shaming is not the point, so much as an accurate accounting for things we have learned to take for granted.

Other tactics may one day include the right to repair, or perhaps even the decision not to play at all. It is telling that Abraham begins *Digital Games after Climate Change* with his childhood dilemma—whether to play on the computer on hot Australian summer days, and thereby risk sleepless nights in an unbearably overheated room (2022, 1). While he often chose to play anyway, future temperatures may take such choices out of our hands.

Conclusion

To wrap up, environmentally speaking, we are clearly at an "all hands on deck" point, or one where we no longer have the luxury of finding the one, best option—instead, we have to try *all* the options. This has to include not only policy, data, and political reckoning, but also media and culture, including games. Although it would be easy to quibble with the categorizations or goal-oriented instrumentalism of *The Environmental Game Design Playbook*, I rather admire the curiosity and ingenuity of the SIG's members. I have watched the SIG's membership balloon from a scattered few to over 500 people, witnessed the rise and sometimes fall of many a collaborative instrument (Trello boards, Google Docs and spreadsheets, Discord channels, and more), and contributed to the difficulties of coordinating so much good intention in the small pockets of time available to people working demanding full-time jobs or beholden to more unpredictable freelance work. All too often the bulk of managerial and emotional labor falls on the

SIG's current cochairs, but what remains extraordinary is that the group's efforts take place largely outside the auspices of any formal arrangement. No one is being paid. Aside from the few academics for whom this might arguably be considered research, most of the people who are giving their time to these workstreams are doing so while also pursuing careers in the games industry or nonprofit sectors.

In sum, I find it refreshing, and necessary, to break the closed loop of academic exchange and recognize that designers and players also have ideas and the ability to theorize through and around practice. More and more, I found myself speaking out about the value of play and games even in the face of climate precarity and the ecologically compromised nature of the industry as it stands. In part, this is because of what games offer us—inspiration, rejuvenation, even comfort, and not just avoidance. I still make time, when I can, to attend the SIG's monthly general community meetings and biweekly workstream meetings. I now also invest more in industry–academy crossover, talking to preprofessional students, artists, and many other kinds of specialists from around the world, to make the case that games can be change agents, but also that we can bring much needed change to games.

Finally, it should be clear that the issue of making games more sustainable as individual objects and sets of supporting practices, and as an industry, depends largely on design, but not only design, for there are intersecting issues like accessibility and socioeconomic disparity. From science and technology studies, Langdon Winner's (1980) discussion of Long Island's low overpasses that were designed to discourage bus traffic and thus keep out poorer, black leisure seekers might lead us to wonder, too, about the design of digital objects. How does a high-resolution object or processor-intensive game present barriers to entry to those without disposable income and an excess of gadgetry? How does a game's development draw from or reciprocate planetary resources and the conditions of the living? To return to Escobar and Fry, we might move design away from defuturing and toward world-building. Escobar cites Anne-Marie Willis to remind us that "in designing tools,… we are creating ways of being" (2017, 4). True, these ways of being are not necessarily egalitarian, as when he recognizes that the Global South is largely the designed by-product of the North. However, Escobar also acknowledges that when "we design our world,… our world designs us back" (2017, 4). While playing *for* the planet, or empowering gamers to "act for nature" may be laudable goals (Takahashi 2021), nature itself has a role to play, too, from epigenetics to the indifferent refusal to sustain continuing human greed. Taking a humbler attitude toward design, not only in deference to the agency of players, but also to a world and material

forces that may or may not be visible but undergird gameplay, would be a truly tactical response.

Ludography

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